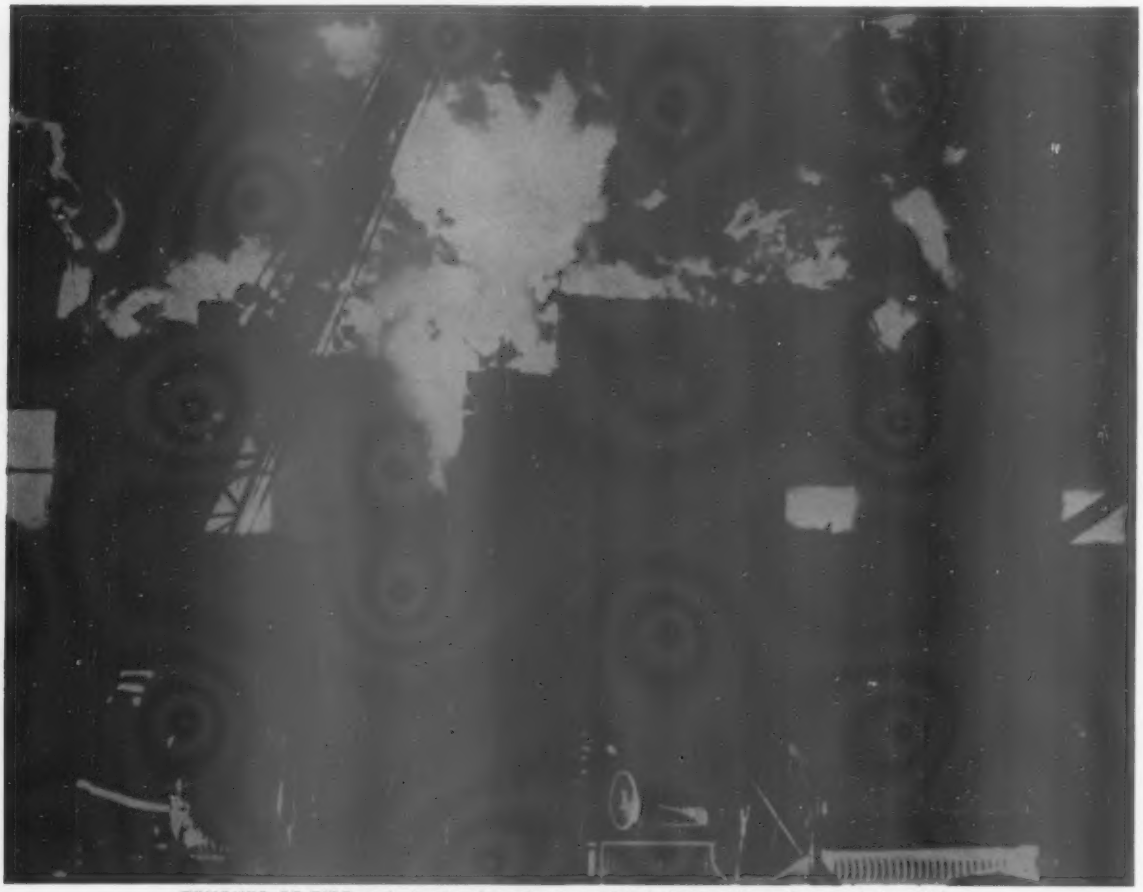
FACTORY

FOR BETTER MANAGEMENT OF PLANT OPERATIONS • A McGRAW-HILL PUBLICATION • PRICE ONE DOLLAR • NOVEMBER 1960

MATERIAL HANDLING

THESE 8 FACTORY EDITORS VISITED 80 PLANTS, SPENT 840 MAN-HOURS, TO BRING YOU THIS SPECIAL REPORT... p.62

Destroyed by fire: $300,000!



TONGUES OF FIRE and clouds of smoke soar high into the air as flames destroy this plant used for processing oil and petroleum products. Damage was estimated at $300,000.

Proof that Grinnell Sprinklers can safeguard your property, save you dollars, keep your business going

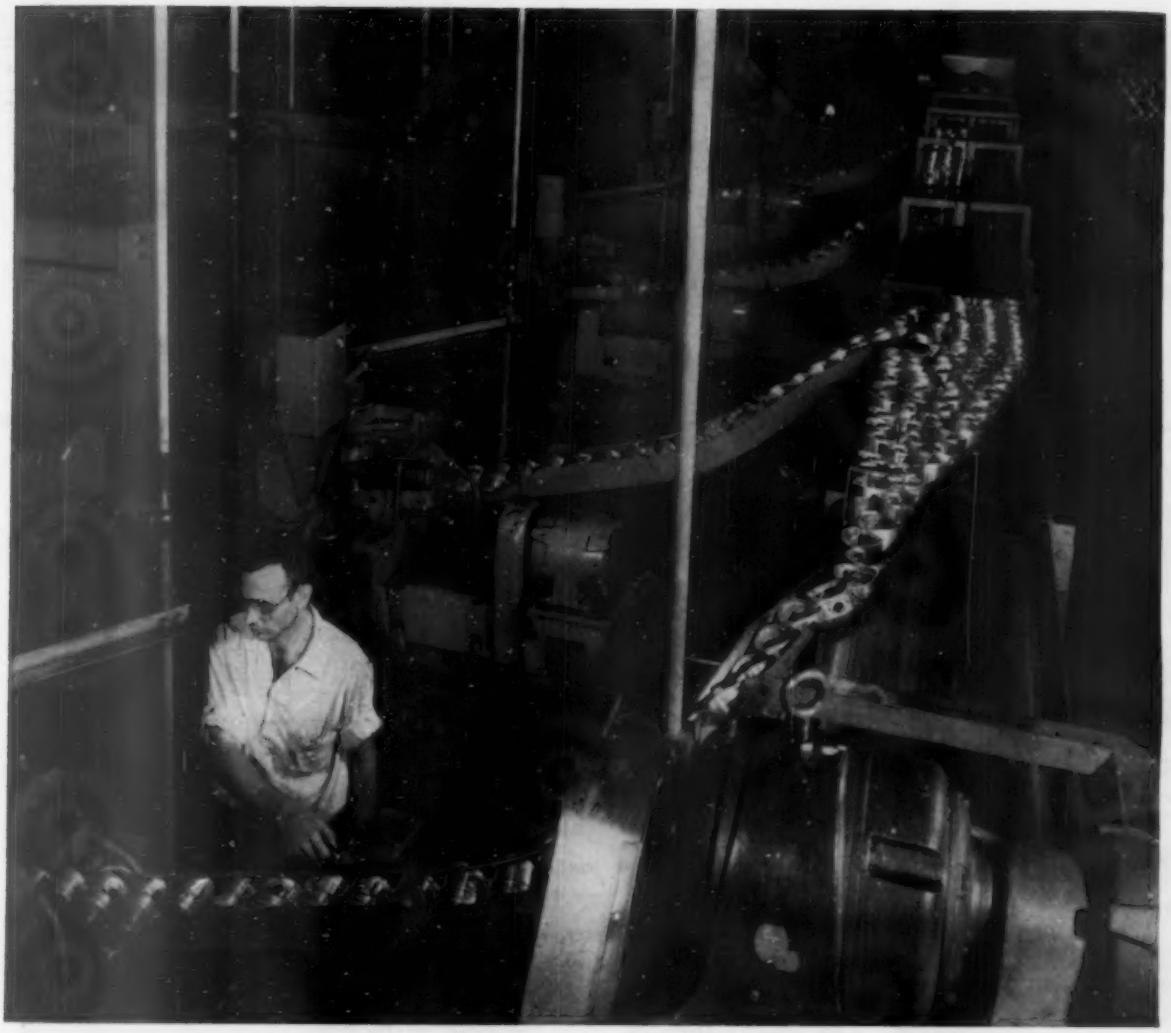
GRINNELL SPRINKLERS quickly put out the fire that developed following an explosion of flammable vapors in air at Naugatuck Chemical, Naugatuck, Conn. Grinnell Sprinklers can always be depended on to perform reliably — to stop fire fast. They can easily be installed with a minimum of inconvenience to you. Grinnell Automatic Sprinkler Protection also makes possible big insurance premium savings — helps you pay cost of installation.

For details, write Grinnell Company, Providence 1, R. I. Branches in principal cities.

GRINNELL

AUTOMATIC SPRINKLER FIRE PROTECTION SINCE 1878

For more facts circle 382 on READER SERVICE CARD



Piston-packing belt helps build new cars

THE combination of sharp edges and oil on those pistons was ruining conveyor belts in four months. They cut grooves in the belt, ripped it, tore off the fasteners which held the belt together. The oil soaked into the belt cover, softened it, formed a dirty scum on the surface. Belts had to be cleaned and repaired constantly.

When a B.F.Goodrich distributor heard of the problem, he recommended a new B.F.Goodrich conveyor belt made of Koroseal flexible material. Koroseal resists scuffing, tearing, cutting; it stands oil, grease, most acids and just about everything else that ruins other materials. It can be vulcanized into a continuous belt, eliminating troublesome fasteners.

After a year's service, the Koroseal belt was still going strong—had lasted three times longer than the belt it replaced—carried over 2 million pistons. Even though this is a premium-priced belt, its cost when measured in terms of useful service is 48% lower than the belting it replaced.

Because the belt has a smooth, nonporous surface that's easy to clean, "locating holes" in the pistons don't get plugged up with dirt.

Your B.F.Goodrich distributor has the exact specifications for the Koroseal belt described here. And, as a factory-trained specialist in rubber products, he can answer your questions about the many products B.F.Goodrich makes for industry. *B. F. Goodrich Industrial Products Company, Department M-922, Akron 18, Ohio.*

Koroseal—T.M. Reg. U.S. Pat. Off.

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CONVEYOR BELTS

FOR BETTER
- PLANT MAINTENANCE & ENGINEERING
- PRODUCTION
- PLANT MANAGEMENT

NOVEMBER 1960

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COMING

In December read and see how sharp management procedures can chop thousands of dollars off your plant's packaging costs. You'll discover it's all a matter of sound communications . . . You'll also find five pages containing all you'll want to know about better records management . . . **In later months** watch for exclusive reports on manufacturing organization, small plant modernization, and how to get better employment testing.

THE COVER
Photographed during their marathon tour of booming Atlanta, and its many plants are (left-to-right) our editors C. G. Quinn, W. A. Bussard, R. W. Christian, B. E. Barnes, M. F. Roberts, O. Stewart, R. S. Rice, R. Grant.

69TH YEAR OF PUBLICATION
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1. Performs like a regular fork lift truck . . .

2. Stacks *left* 90° in narrow 6′ aisles . . .

3. Stacks *right* 90° in same narrow aisles . . .

4. Drives loads into trailers and boxcars!

One truck . . . one operator . . . does all this!

(Only the new Towmotor "Naro-Aisle-Stack" Truck can!)

- **Only truck of its kind for narrow 6-foot aisle stacking**
- **One lift truck does the work 3 trucks usually do**
- **Makes 36.5% of "lost" space usable in average plant**

Amazing performance? You can't imagine what the "Naro-Aisle-Stack" lift truck will do until you actually see it . . .

See how it pivots loads a full 180° because it's equipped with hydraulic outriggers. See how it stacks materials left or right 90° and picks up loads from the same extreme angle. See how it also performs all other functions of regular fork lift trucks.

Most spectacular of all is the way it performs within the confines of narrow, six-foot aisles—enabling you to utilize storage space you considered "lost"!

Such unique operation is made possible only because "Naro-Aisle-Stack" trucks are equipped with *Towmotor Towmostatic Drive* – the only drive of its kind that eliminates clutch, transmission, drive line, differential and shifting mechanism.

Ask for booklet, "Captures Lost Space," describing the new series. Write Towmotor Corporation, Cleveland 10, Ohio.

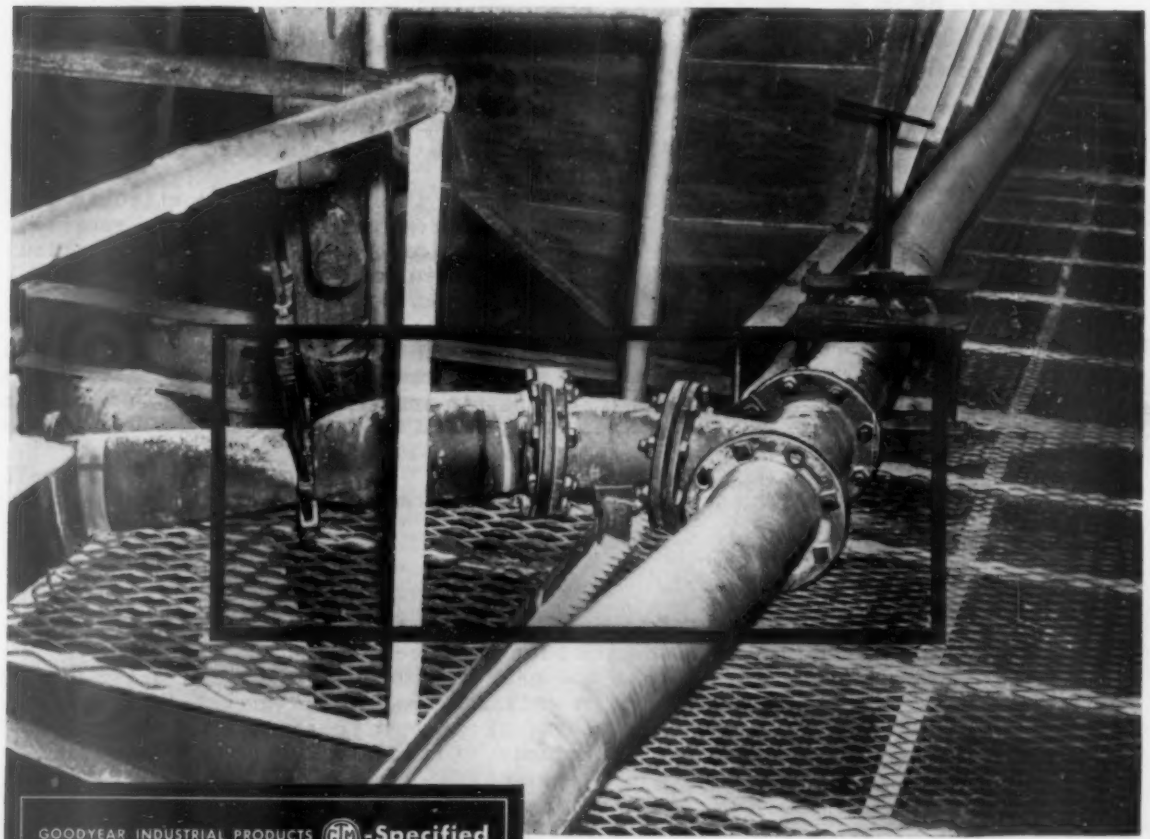
New Naro-Aisle-Stack Trucks made only by... TOWMOTOR THE ONE MAN GANG® - GERLINGER

For more facts Circle 385 on Reader Service Card

Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

GOODYEAR

It isn't often you make a 25%-35% maintenance saving in a key operation. But the G.T.M.—Goodyear Technical Man—made it possible at a pumping operation of a Midwest mine. His recommendation: Diversipipe in place of short-lived iron pipe for the bulk of the slurry line. This rugged, flexible rubber pipe—along with special G.T.M.-specified pinch valve hose and rubber-lined fittings—now carries the murderously abrasive slurry throughout the processing plant. What's more, at last report, the Diversipipe, pinch valves and fittings had been handling this tough job for five full years and were still going strong.



GOODYEAR INDUSTRIAL PRODUCTS GTM-Specified

Diversipipe for handling abrasives and corrosives

A Long-lived abrasion- and weather - resistant cover

B Reinforcement of steel wire helix plus wrapped plies of heavy-duty fabric

C Special rubber tube to withstand abrasion and corrosion

Time and time again — the moneysaving answer to a profit-eating problem is Goodyear hose.

For the answer to your industrial rubber problems, call on the G.T.M.-Goodyear Distributor team. Your Distributor also supplies the superior Conveyor Belts, V-Belts and other industrial products that make G.T.M. recommendations pay off. Just look under "Rubber Goods" and "Rubber Products" in the Yellow Pages. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

Lots of good things come from

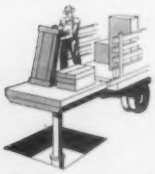
GOODYEAR

Diversipipe—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

THE GREATEST NAME IN RUBBER

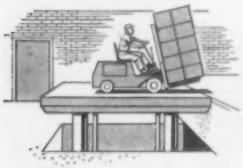
Low-cost way to load or lift

HYDRAULIC POWER HAS MANY USES IN MODERN INDUSTRY



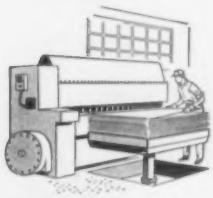
No loading dock needed

The Rotary Levelator Lift loads trucks from plant floor level, becomes part of floor when not in use. Economical, dependable oil-hydraulic operation.



Speed plant traffic

Move materials from one floor level to another on this heavy-duty hydraulic lift. Eliminates detours, saves space required for long ramps, and increases plant safety.



Efficient machine feeding

Keeping materials at convenient working level is just another use for versatile Rotary Levelator Lifts. Automatic controls speed operations, save on manpower required.

Rotary Oildraulic Levelator Lifts have countless applications in modern industry. Standard 6,000 and 12,000-lb. models are adaptable to many installations, special lifts with capacities to 300,000 lbs. or more can be engineered to your specifications. Mail coupon for more information.

Rotary Industrial Lifts

ROTARY LIFT COMPANY

Division of Dover Corporation

Memphis, Tenn.—Chatham, Ont.

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1155 Kentucky
Memphis 2, Tenn.

Please send information on Rotary Levelator Lifts.

*Name*_____

*Address*_____

_____

FACTORY LETTERS

New plant concept catches on

Dear Sir:

I would like to compliment you on an excellent article, "Controlled Plant Information" in FACTORY's August issue (page 60). The plant manager of our American Chain Division (York, Pa.) thought so highly of this article that he distributed it to all key plant personnel.

Controlled plant information has particular significance for our company because we are embarking on an extensive data processing program in our various plants. I feel certain that all our key plant personnel will find it helpful.

Plant personnel who would welcome a new machine tool and readily appreciate its value, often look with suspicion and mistrust upon mechanization of their record keeping. An article such as yours—couched in terms of their record keeping—will do much to remove the mystery and suspicion.

T. G. Campbell
Staff Analyst, American Chain & Cable Co.
Bridgeport, Conn.

Dear Sir:

Congratulations on "Controlled Plant Information." It's the best I've seen.

For the past nine months I've been coaching IBM salesmen on sales training programs. I have a different tactical approach from you. I'm a little easier on accountants, but I leave no doubt in anyone's mind that accountants are trapped by their own procedures. And as long as they have so much support from red-tape mongers—reaching all the way to the Internal Revenue Service—they are not likely to adjust to reality.

I also approach the installation a bit differently from you. I find that a team project, focused on an "ideal" information flow chart, gives me a good starting point. This "blue sky," or ideal, start is impractical, and therefore offers no particular threats to participants. To avoid making people defensive, I stay away from detailed charting of present practices. The final system is more the work of the people who will live with it.

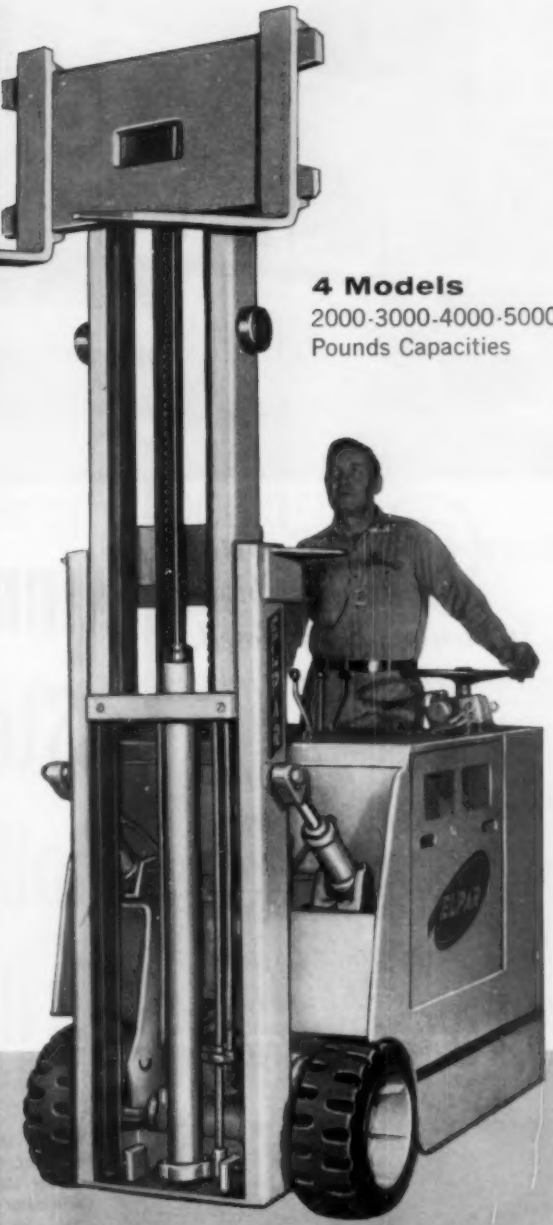
This is an awfully big, and in many ways alarming field; it needs our best.

A. B. Cummins
Chairman Industry Department
Western Reserve University, Cleveland.

Dear Sir:

I have just finished reading your article "Controlled Plant Information." I feel that it is one

ELPAR "Cargo-Scout"



4 Models
2000-3000-4000-5000
Pounds Capacities

...For FAST ACTION in TIGHT SPOTS!

Here's a fast truck built to slip through narrow aisles...load freight cars and trucks...keep things moving on crowded docks. ELPAR's ultra-compact Cargo-Scout, designed to solve *your* trickiest material handling problems, is a heavy-duty, stand-up, end-control electric fork truck built for speed and handling efficiency.

The Cargo-Scout's short wheelbase and narrow overall width assure maximum maneuverability in conjested areas. Its safety-engineered optional hand or foot controls enable the operator to drive forward or backward with equal ease. Fast acceleration and high speed lift and travel assure maximum productivity.

Although small and compact, the ELPAR Cargo-Scout accommodates a full-size 32 volt battery – power packed for a full 8 hours operation!

Dozens of other *user-important* advantages of the ELPAR Cargo-Scout await your inspection. *Compare* the Cargo-Scout with any other competitive truck. Feature by feature, the Cargo-Scout adds up to *substantial* handling cost reduction.

This "Cargo Scout" is used for narrow aisle stacking at the distribution center of the Stop & Save Trading Stamp Corporation, a wholly-owned subsidiary of The Grand Union Company.

You can LEASE a Cargo-Scout under the flexible, low-cost ELPAR lease plan.

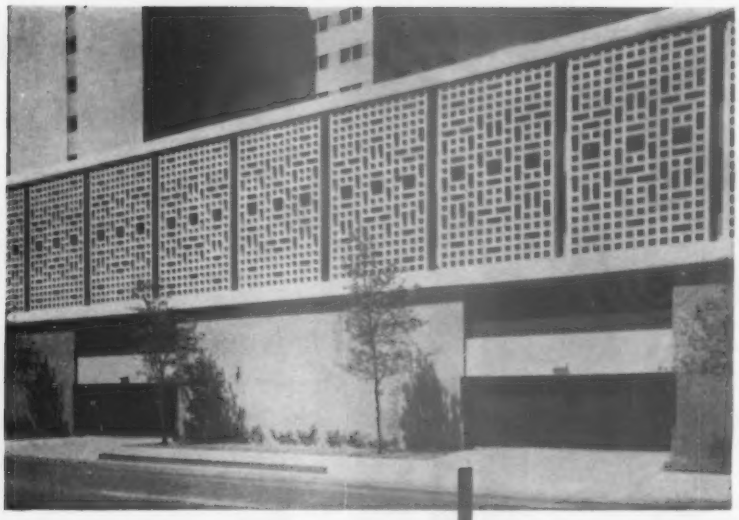
Send for this Cargo-Scout catalog today!

ELPAR
ELECTRIC TRUCKS

THE ELWELL-PARKER ELECTRIC COMPANY
4020 ST. CLAIR AVE. • CLEVELAND 3, OHIO
In Canada: International Equipment Company, Ltd.

Leading producer of electric powered fork, platform and crane trucks

For more facts Circle 388 on Reader Service Card



Upward-acting, all-metal grilles that block intrusion when closed, without cutting off light, air or vision . . . coil quickly out of the way above the opening whenever desirable . . . and complement the beauty of today's most distinguished buildings and architectural designs

Kinnear Steel Rolling Grilles

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Built of steel, aluminum or bronze, to fit any doorway or other opening — with motor or manual control — for face-of-wall or under-lintel installation — made by the makers of . . .

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Saving Ways in Doorways

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1540-60 Fields Avenue
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San Francisco 24, Calif.
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of the best magazine articles oriented to top and middle management that I have ever read. Many articles have been written for systems-oriented personnel, but too often they miss the executive who must make the decisions.

I will be looking forward to other articles of this type in FACTORY.

Tosh Nakahiro
Senior Systems Analyst
Cannon Electric Co.,
Los Angeles.

Old elements of new theory

Dear Sir:

It was good to note, in the August issue of FACTORY (page 84), that you espouse Professor McGregor's management theories in his book "The Human Side Of Enterprise."

You may not remember that FACTORY published an article in 1953 expressing a similar point of view. You are, in fact, still offering it as Reprint A57, "Worker Psychology—A Formula That Works."

I remember it well. I wrote it.

Daniel Krakauer
Vice President
Kay Manufacturing Corp.
Brooklyn 1, New York

Electrical planning pays off

Dear Sir:

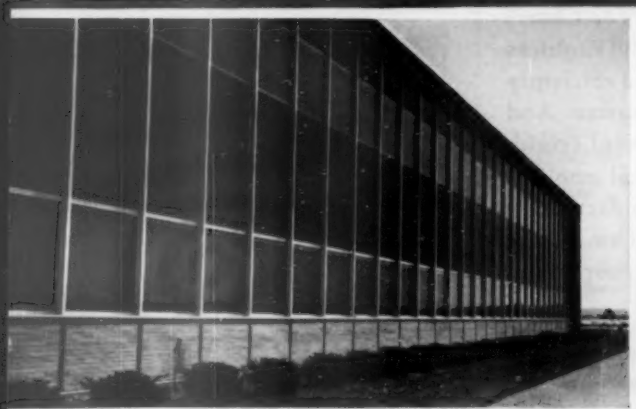
The September issue of FACTORY, with your article about renovation of Brunswick, Balke, Collender's

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY 330 West 42nd St., New York 36.

See Bethlehem's exhibit on three of the "Top Ten Plants of 1960," chosen by Factory Magazine, at the Industrial Building Exposition and Congress, December 12-15 in the New York Coliseum. See why it makes sense to design industrial buildings with steel, to build them with steel. Stop by Booth 1006-10. We think you'll enjoy your visit.

Steel

for Strength
... Economy
... Versatility



Bethlehem fabricated and erected the steelwork for Chrysler Corporation's newest assembly plant, Fenton, Mo., one of the "Top Ten Plants of 1960," and one of the three plants which will be described pictorially in Bethlehem's exhibit at the Industrial Building Exposition and Congress in the New York Coliseum.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. *Export Sales: Bethlehem Steel Export Corporation*

BETHLEHEM STEEL

BETHLEHEM STEEL

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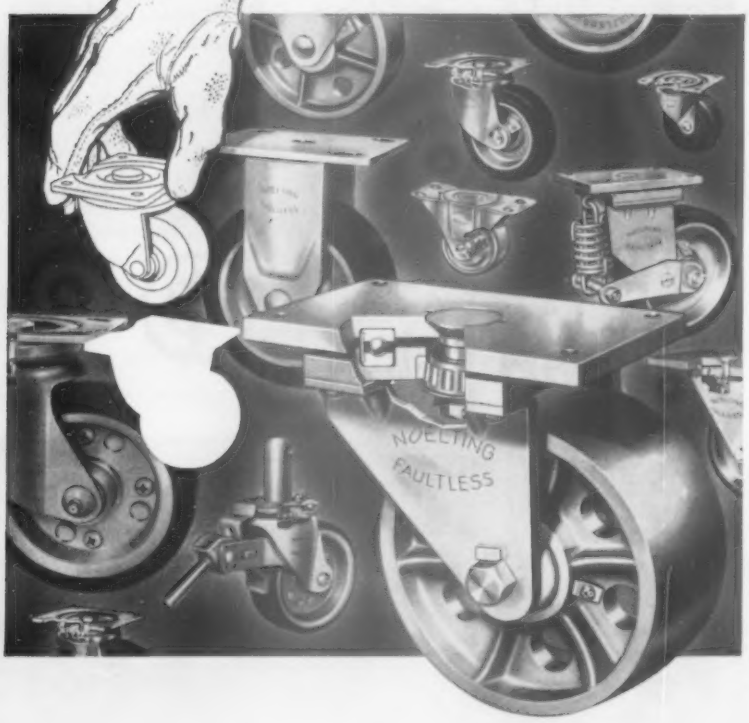
the ONE Caster Source is

Faultless



Faultless manufactures over 10,000 caster types, sizes, and varieties . . . casters for every conceivable purpose . . . *The Casters* to move your products easily, in quantity, economically! Faultless Casters are engineered and tested to roll smoothly and efficiently under any load from 15 lbs. to 15,000 lbs. per caster. And Faultless manufactures a complete selection of swivel, rigid, plate, and stem casters, plus a wide variety of special application casters. This complete selection from one manufacturer—Faultless Caster Corporation—includes *The Casters* to reduce materials handling costs and increase efficiency at your plant.

Your Faultless Industrial Distributor, or your nearby Faultless Sales Engineer can supply you with detailed information on the complete Faultless Caster line. Also, your Faultless Distributor maintains a substantial stock of Casters for immediate shipment.

INDUSTRIAL DISTRIBUTION — THE RIGHT HAND OF PRODUCTION

NOELTING Faultless Casters

Faultless Caster Corporation

EVANSVILLE 7, INDIANA

Branch Offices in principal cities of the U.S.; see the Yellow Pages of the telephone book under "Casters." Canada: Stratford, Ontario

plant electrical facilities, has received considerable attention locally. We thought you did an excellent job of presenting the program, and hope it will help others sell programs of rehabilitation and improvement. We believe it will help in our plant.

The wisdom of this kind of planning becomes even more apparent when faced with new programs like our present one—doubling the size of the Pinsetter Plant. Our initial substation was arranged for double ending, so it will be relatively simple now to add the second transformer. The new high voltage switchgear at the distribution point near the meter house will also permit us to do this work with a minimum of interruption to other parts of the plant.

Bob Neff
Director of Plant Facilities
The Brunswick, Balke, Collender Co.
Muskegon 82, Mich.

FACTORY

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. . . and they're all here in this new 32 page report

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*TOTE AND TOTE SYSTEM REG. U.S. PAT. OFF.

Which spray method

	Conventional Spray	Hot Spray
IT ALL DEPENDS ON object size and form	Whether it's a missile or a light-bulb filament, conventional spray is practical with its wide selection of nozzle combinations and gun types.	Comparable to conventional spray for versatility and range of service. Permits heavier coating of vertical surfaces without runs or sags—better film build on corners and edges.
Where you paint	Practical almost anywhere, indoors or out. If spraying is prolonged, good ventilation is recommended.	The only method suitable for painting where temperatures are low or fluctuating. Because overspray is all but eliminated by this method, intermittent spraying may be done in the absence of a spray booth.
Requirements of the coating	For average coverage, conventional spray can yield fine quality as well as uniform finishes. Heavy coatings with mastics are attainable.	Provides much heavier film build using normal-solid-content materials; helps overcome blushing of lacquer; maximum flow-out minimizes orange peel. Excellent coverage of sharp edges and corners.
Film-build specifications	With average-viscosity paints, film builds up to .6 or .8 mils are attained with a single coat. Multiple coats are required for heavier coatings.	A single coat of heated paint frequently achieves twice as much film build as coatings applied by other spray methods. Less shrinkage during drying keeps corners and sharp edges more thoroughly protected with heavier dry film.
Properties of the coating material	Wide selection of nozzle combinations and gun models will handle practically every type of liquid or mastic, including highly abrasive ceramics and other coarse materials.	Lacquers, enamels, and organic materials whose viscosity is reduced by higher temperatures (under 180° F) are best suited to hot spray. Wide range of caps and tips allows selection of any type pattern or width desired. Sprays at pressures as low as 18 psi.
Speed of application	Rate of application is extremely wide to meet average and special needs. Adaptable to automatic processes with multiple guns where high rate of coating is needed.	Comparable to conventional spray in all respects, with added advantage of heavier film builds if desired.

will work best for you?

Airless Spray

Broad, plain surfaces provide the best opportunity for this method. Small objects or narrow surfaces (under 3") reduce efficiency.

Ideally suited for spraying inside cavities or enclosures, and indoors wherever paint rebound may be a problem with other spray methods.

Produces full, wet coats with good film build and coverage, particularly in corners and crevices.

Coating is very comparable to conventional spray for coverage. However, the wetness of the film makes it more susceptible to sags and runs on vertical surfaces.

Well suited for light or heavy liquid paints of relatively fine grind that do not contain abrasive pigments.

Produces a very large spray pattern for ultrafast coverage of large areas where close control is not a necessity.

An analysis of the job at hand, of the conditions under which painting must be done, of the type and quality of finish desired—all are important factors determining which spray method is best suited to your job.

DeVilbiss, through total service, gives you an unbiased recommendation on the finishing method most economical for you. That's because DeVilbiss designs, manufactures, installs, services, and guarantees all major types of finishing equipment. One source fully qualified to analyze and supply your various needs. Take advantage of total service now! The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Offices in principal cities.

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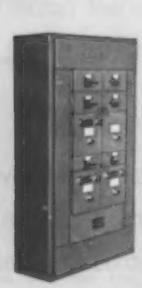
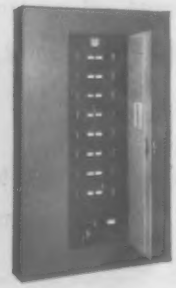
Safety Switches for Normal and Hazardous Locations

Industrial Circuit Breakers for Normal and Hazardous Locations

Load Centers—Circuit Breaker and Fusible

D ...design leadership D ...design l

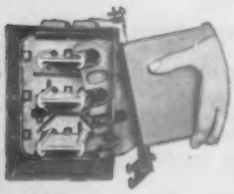


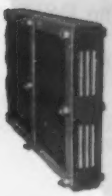


Fusible and Circuit Breaker Lighting and Power Panelboards

Power Distribution Switchboards and Switchgear

Plug-In Duct

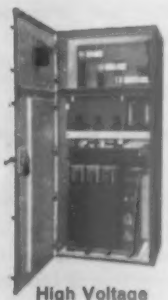




Feed-In Duct

Motor Control Centers

Synchronous Motor Starters



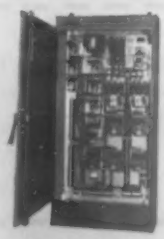
High Voltage Starters

Wireways

Field Engineering Service

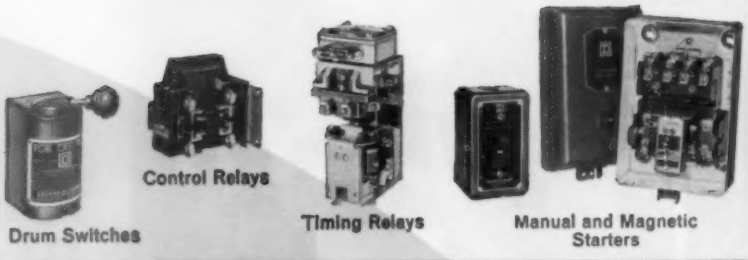
is available through more than one hundred Square D offices, backed by an international network of over 1000 authorized electrical distributors and 19 plants in the United States, Canada, Mexico and Great Britain.

Executive Offices • Executive Plaza, Park Ridge, Ill.



Special-Purpose Control

D SQUARE D COMPANY



A *Complete* LINE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT

eadership D ...design leadership

- ADJUSTABLE SPEED DRIVES
- BUSWAYS & WIREWAYS
- CIRCUIT BREAKERS
- CONTROL CENTERS
- CRANE & HOIST CONTROL
- DISTRIBUTION SWITCHBOARDS
- ELECTRIC TRUCK CONTROL
- HIGH VOLTAGE CONTROL
- LAUNDRY CONTROL
- LIFTING MAGNETS
- LIGHTING AND POWER PANELBOARDS
- LIGHTING CONTROL—LOW VOLTAGE
- LIMIT AND FOOT SWITCHES
- MACHINE TOOL CONTROL
- MAGNETIC BRAKES
- METER MOUNTINGS
- MOTOR STARTERS
- PRESS CONTROL
- PRESSURE, FLOAT, & VACUUM SWITCHES
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- RELAYS AND CONTACTORS
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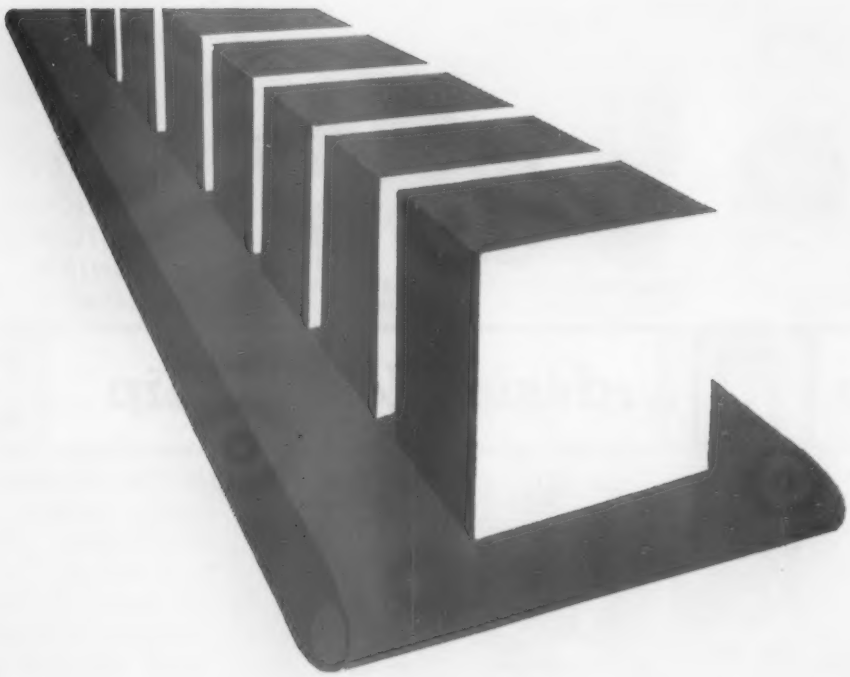
- STAGE DIMMERBOARDS
- STEEL MILL CONTROL
- SWITCHGEAR & UNIT SUBSTATIONS
- SYNCHRONOUS MOTOR CONTROL
- TERMINAL BLOCKS
- TEXTILE MACHINE CONTROL
- TIMERS
- VOLTAGE TESTERS
- WELDER CONTROL

wherever electricity is distributed and controlled

For more facts Circle 394 on Reader Service Card



Today's low-cost way to automate your operation costing is with Keysort Data Processing

For the fast, accurate statistics that help control every stage of manufacture; for the up-to-the-minute information you require in such vital areas of plant control as inventory, labor costing, application of burden rates — Keysort is the data processing system to use.

The reasons are many. No restrictive procedures; minimum training; remarkable economy; simplicity of installation and operation.

Keysort, in fact, is the only automated data processing system flexible enough to fit your company as it stands *and* as it grows. It is the one system adaptable and affordable to companies of every size.

With Keysort you use easy-to-handle punched cards —mechanically created for rapid sorting and classification. Results are automatically tabulated and summarized direct to reports without transcribing.

Result: Keysort automates your data processing to give you the meaningful on-time information you need for complete control of your plant and your profits. Monthly, weekly, daily. And at truly low cost.

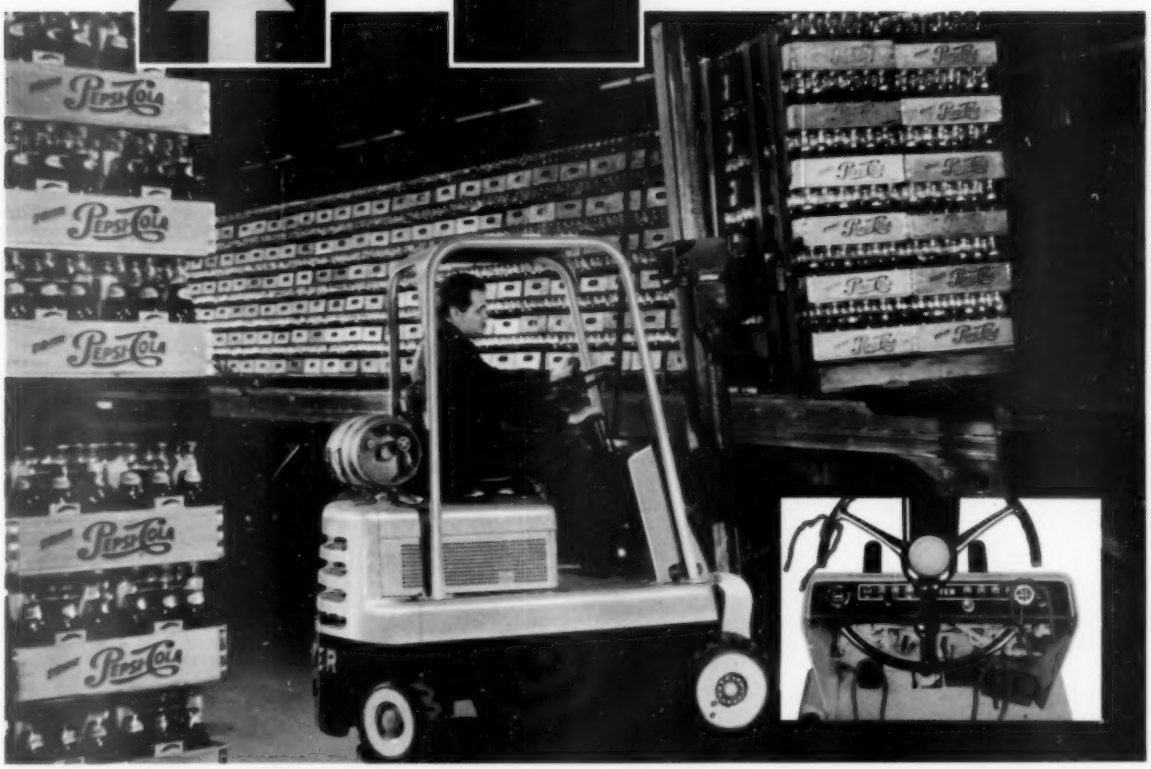
Your nearby Royal McBee Data Processing Systems Representative has had a wealth of experience in solving plant control problems. Working with your plant managers and foremen, with your systems and procedures experts, he can offer helpful advice about a low-cost Keysort system tailored to your individual requirements. Call him, or write us at Port Chester, N. Y.—indicating the applications in which you are interested — and we will be happy to supply you with actual case histories from our files.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

For more facts Circle 395 on Reader Service Card

HYSTER



Monomast high visibility upright — a Hyster exclusive.

monotrol for safe, fast handling — *Only* HYSTER® has it!

Move more tonnage per hour with Hyster lift trucks with Monotrol control.

All driving functions except steering are foot controlled – for smooth, natural coordination – safe, rapid handling.

Right foot Monotrol pedal controls power – forward-reverse – Hystamatic transmission. Left foot controls brakes and truck inching. Hands are free for steering and load control.

Safest, easiest trucks to drive. Quickest to service – cheapest to maintain.

Call your Hyster dealer or write for literature.

INDUSTRIAL TRUCK DIVISION—Lift trucks, mobile cranes, straddle carriers
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P. O. Box 847 • Danville, Illinois

SAFEGUARDS ITS PROPERTY WITH ADT *Automatic* PROTECTION

Selected by FACTORY magazine as one of the nation's Top Ten for 1959, the new Cutler-Hammer low-voltage distribution apparatus plant is a model of clean building lines and uncluttered working space—with plenty of growing room.

Automatic operations within the 300,000 square-foot plant are used wherever possible, even to safeguards against fire and intrusion.

ADT Sprinkler Supervisory and Waterflow Alarm Service maintains a continuous, automatic check on water supply to the sprinklers and will automatically summon fire fighters in case of fire. In unsprinklered plant areas, ADT Aero Automatic Fire Alarm Service will automatically detect and report a fire in those vital first few minutes. Failure of Cutler-Hammer watchmen to signal while on patrol will result in prompt investigation.

ADT SERVICE CAN HELP YOU, TOO...

Whether your project is old or new, sprinklered or unsprinklered, there is an appropriate ADT Automatic Protection Service to meet every requirement. An ADT specialist will show you how combinations of *automatic* services can safeguard property, profits, and employees' jobs, at lower cost than other, less effective methods. Call the ADT sales office listed in your phone book; or write to our Executive Office.

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

Executive Office: 155 Sixth Avenue, New York 13, N. Y.

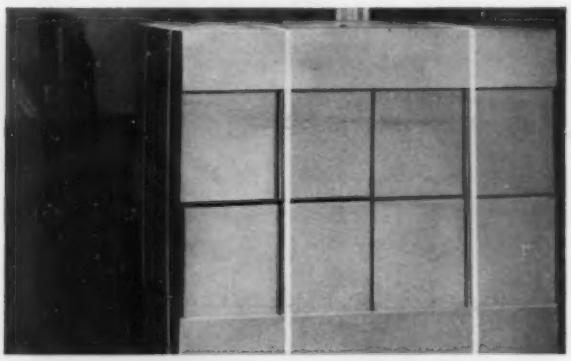
A NATIONWIDE ORGANIZATION

ADT

NEW SAVINGS

1 **New strapping material—new low cost. Made of super-strong Avisco® rayon, AVISTRAP cord strapping costs less than metal strapping and reinforced tapes of comparable strength, offers many more important advantages.**

2 **Easy handling, lightweight. All coils of AVISTRAP cord strapping weigh 21 lbs. Yardage equals 100 lb. coil of comparable width steel strapping. Simple, low-cost dispensers permit replacement of coils in a few seconds.**



3 **Low cost per package. You invest less per package with AVISTRAP because its initial cost is low. In many instances, corner protectors can be eliminated. AVISTRAP is also extremely safe to handle, won't injure personnel.**

4 **Saves on shipping costs. AVISTRAP adds little weight to packages—as little as one-seventh the weight of steel strapping. Result: substantial savings for shippers. Also important, AVISTRAP won't damage merchandise.**

AVISTRAP* CORD STRAPPING

Super Strength • Safety • Reduced Damage • Easy Handling • Locally Available

AVISTRAP*
CORD STRAPPING

*Trademark of American Viscose Corporation. Patents pending.

AMERICAN VISCOSE CORPORATION, INDUSTRIAL PACKAGING DEPT.
1617 PENNSYLVANIA BLVD., PHILADELPHIA 3, PA.

Make Your Own Test (check to indicate request)

☐ Please send me sample and information.

☐ Please put me in touch with distributor nearest me.

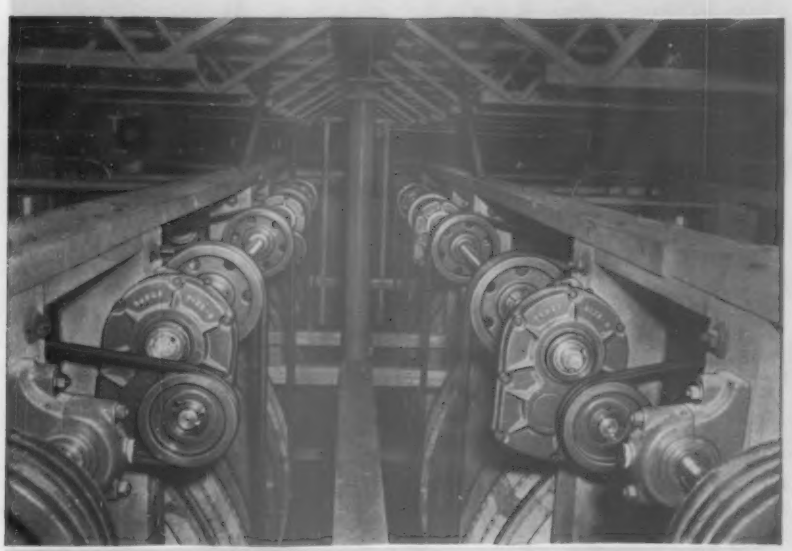
Name_____

Title_____

Company_____

Address_____

City_____ State_____



DODGE TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

Install it anywhere—with minimum time and effort. Here is an overhead installation on tanning drums. Torque-Arm reducers are resistant to acid fumes, salt water environment, moisture.

DODGE TORQUE-ARM SHAFT MOUNTED SPEED REDUCER

Can be positioned any place on the entire length of the shaft. It locks into place on *both* sides of the housing. Note modified torque arm on this installation on a mixer in a beverage plant.

The Speed Reducer Idea that

Two things account for the record popularity of Dodge Torque-Arm Speed Reducers. First, they cost less to install since they require no foundations, sliding motor rails or flexible couplings. Second—and most important—these modern reducers as developed by Dodge perform *brilliantly*. Tens of thousands of installations underscore Torque-Arm dependability. Torque-Arm is America's *quality* shaft mounted speed reducer!

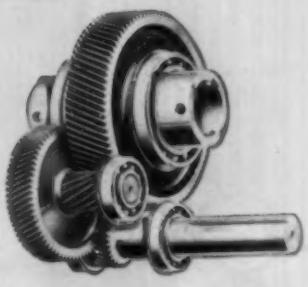
Torque-Arm has been so extensively adopted by industry that today models are available for a vast range of applications. The Torque-Arm line offers you capacities up to 170 hp—output speeds from 10 to 400 rpm—in single and double reduction series—with 5 to 1, 15 to 1 and 25 to 1 ratios. Models for vertical or inclined shaft operation are available—as well as special-application versions such as flange mounted, right

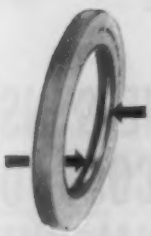
Rugged semisteel housing— a solid backbone for solid service

Here is a tough, corrosion-resistant housing with the strength to hold bearing seats in line for the life of the unit. Perfect shaft and gear alignment are assured by doweling the matched halves together and boring in line. No gear is overhung. Loads are carried easily, contributing to Torque-Arm's long life and high efficiency—97% in double reduction models, almost 99% in single!

AGMA rated gears— quality-guarded by continual tests

These helical gears have soft cores to withstand shock—and hardened surfaces to resist wear. Their quality is guarded in manufacture and assembly by the most modern methods of quality control, including inspection for runout, tooth spacing, helical lead and involute profile. They run quietly, mesh precisely. Teeth are crown shaved for maximum contact area. Gears are shrunk on their shafts to prevent shifting.





Modern double-lip seals keep oil in and dirt out

Modern synthetic, double-lip seals of the highest quality keep oil in and dirt out of the reducer case. These seals offer protection for the unit from dust and dirt and just as effectively insure cleanliness when operating in laundries, textile mills, food processing plants.

Re-ally Clicked!

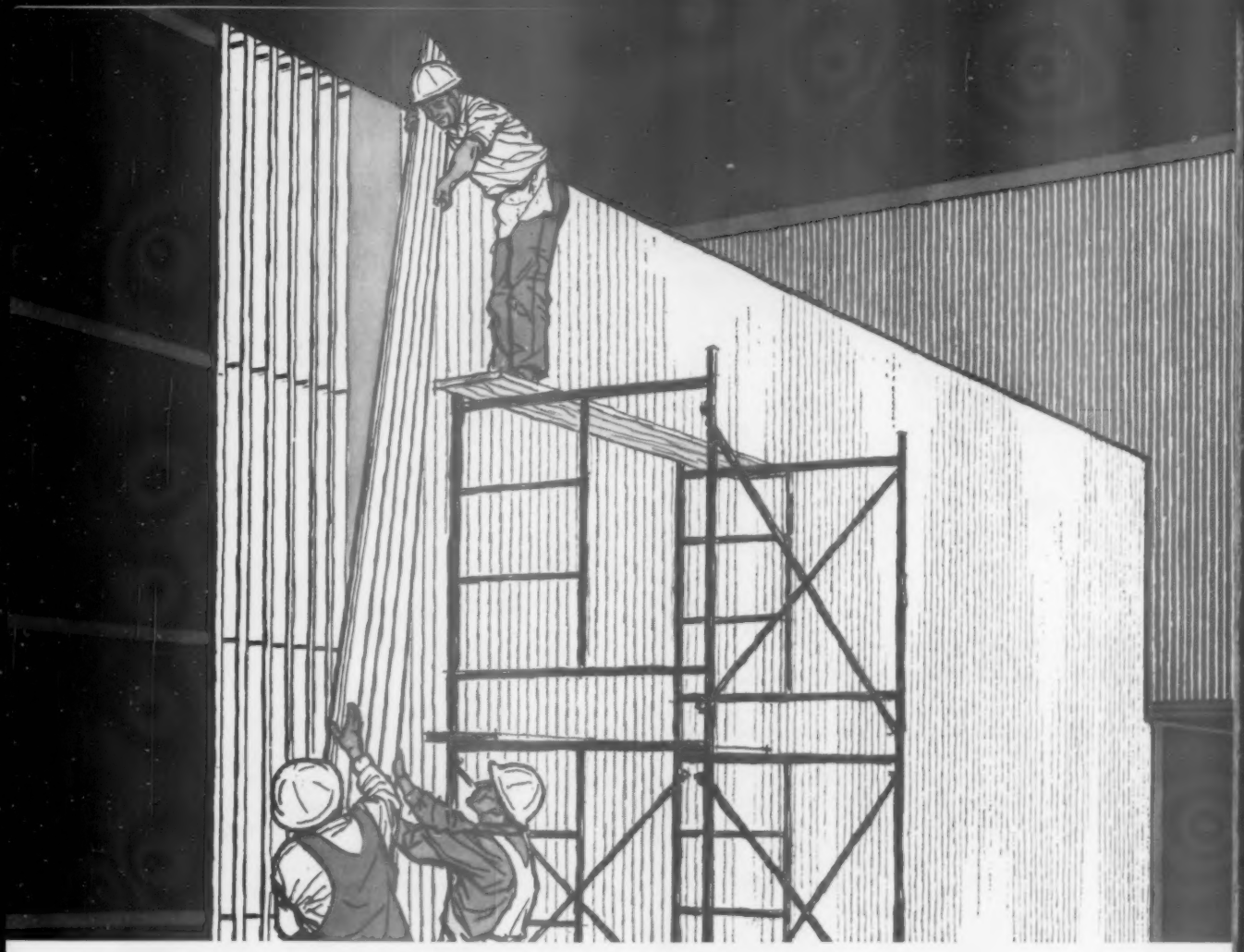
angle and extended input shaft styles. Optional equipment includes a positive, sealed-in backstop and a positive overload release.

Ask your local Dodge Distributor. Or write us for our 64-page Torque-Arm Speed Reducer Bulletin, complete with engineering data and easy selection tables.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."



NEW TRUSCON CURTAIN WALL PANELS INSULATED OR NON-INSULATED... LOW COST FOR COMMERCIAL AND INDUSTRIAL BUILDINGS

Notice the sharp, clean interior lines presented by Truscon 24″ FERROBORD and Insulated Wall Panels.

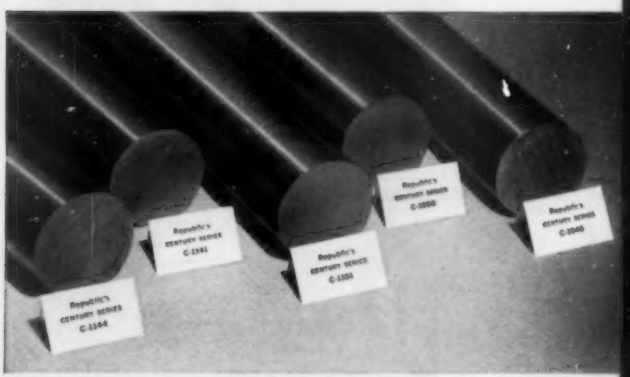
Truscon Curtain Wall Panels, insulated or non-insulated, are the answer to fast, economical commercial and industrial housing. Architecturally beautiful to blend with modern industrial park, commercial service and shopping centers.

Truscon Insulated Panels are constructed by sandwiching a layer of insulating material between two sheets of Truscon 24″ Ferrobord® or galvanized ribbed sheeting. Panels are securely interlocked and button-punched for maximum weather-tightness. Panels are furnished painted or galvanized, in widths of 2′-0″, and up to 40′-0″ in length.

Low installation cost, very little maintenance cost, and available for immediate delivery. Call your Truscon representative, or write direct for additional data.

For more facts Circle 399 for Curtain Wall Panels, 400 for Heat Exchanger Tubes, 401 for Cold finished steel bars, 402 polyethylene-coated conduit.

REPUBLIC ELECTRUNITE® "DEKORON-COATED"® E.M.T. protects your electrical wiring systems, outlasts standard conduit ten-to-one in highly corrosive conditions of service. A tough coating of polyethylene encases strong, lightweight E.M.T. in an end-to-end armor that is impervious to gases, fumes, steam, and other corrosive atmospheres. Easy to cut, easy to install. Also available on Republic Hot Dip Galvanized Rigid Steel Conduit. Send for additional information.


Republic's CENTURY SERIES C-1144
Republic's CENTURY SERIES C-1141
Republic's CENTURY SERIES C-1151
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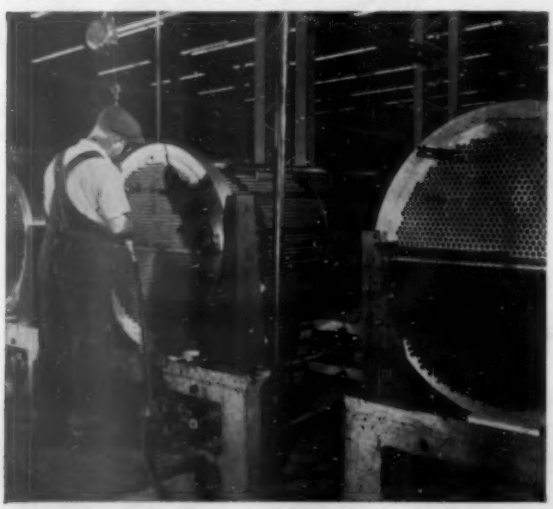
Republic's CENTURY SERIES C-1045

REPUBLIC CENTURY SERIES COLD FINISHED STEEL BARS . . . in 5 grades, 5 degrees of machinability, 5 price levels! To save time and money in steel parts production, choose from this family of five grades of high strength, stress-relieved, cold finished steel bars. Republic's CENTURY SERIES provides varying degrees of machinability. Yet, each grade offers minimum yield strength of 100,000 psi. Better strength-toughness ratios are frequently obtained by selecting one of the lower sulphur, less expensive grades. Return coupon for your free copy of Republic's CENTURY SERIES Booklet.

FARROWTESTED FOR YOU! Predictable, dependable service is measured for you when you specify Republic ELECTRUNITE Heat Exchanger Tubing—in either carbon or stainless steels. And, FARROWTEST is offered as an alternative to other less positive tests at no increase in cost! ELECTRUNITE is produced to ASTM specifications to meet pressure vessel code and insurance requirements. Send coupon and learn why FARROWTESTED Republic ELECTRUNITE Heat Exchanger Tubes are better.



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This STEELMARK of the American Steel Industry tells you a product is made of Steel. Look for it when you buy.

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Please send more information on the following products:

- ☐ Truscon Insulated Curtain Wall Panels
- ☐ Republic ELECTRUNITE "Dekoron-Coated" E.M.T.
- ☐ Republic CENTURY SERIES ☐ FARROWTEST®
- ☐ ELECTRUNITE Heat Exchanger Tubes

Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

No more hand stacking. This newspaper counter-stacker counts and stacks newspapers automatically—and can be programmed to automatically vary the stacks to meet route schedules.

No more dry pumping. Cutler-Hammer's new development—an automatic pump off control for stripper oil wells—stops the pump when oil has been lifted. Saves the pump, ups production.

What's new in control for automation?

A blast furnace that charges itself

More efficient automation because the Cutler-Hammer control systems man was called in at the start of planning. The art of charging a blast furnace is now a science.

Cutler-Hammer control engineers, with the furnace builders, worked three years to put all charging control functions into one integrated system. Now, the proper material in the proper amounts, all in a proper sequence are delivered to the furnace bell—automatically.

Every step of the operation can be checked visually on master control panels. Nothing is left to chance. The added cost of this kind of charging control is relatively insignificant. Complete flexibility in selection of furnace charging programs now makes possible optimum blast furnace performance.

Why you should call in the electrical control man early. Cutler-Hammer has been increasing productivity and lowering costs for many different companies in many different industries for years. This is a major reason why Cutler-Hammer should be called when you *start your automation planning.*

The company on the move. There's a new vitality at Cutler-Hammer—a new desire to solve problems. We've planned for the gigantic expected growth of the sixties and now we're ready—with new plants, new engineering talent, new and better products. We'd like to tell you about ourselves if you're planning ahead. Contact the Cutler-Hammer sales office nearest you.

Automation is more efficient when the control expert is called in early.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

For more facts Circle 403 on Reader Service Card

OWNER: *Public Service Company of Colorado*
ARCHITECTS: *G. Meredith Musick & Clayton C. Musick*
ELECTRICAL CONSULTANTS: *Swanson — Rink & Associates*
ELECTRICAL CONTRACTOR: *Howard Electric Co.*
TOTAL FLOOR AREA: *77,400 square feet.*

Electrical Protection goes MODERN *with* BUSS Fuses . . .

in the New Service Center of the Public Service Co., of Colorado

This recently completed service center, — located at 2701 West 7th Ave., in Denver, Colorado — has fuses installed throughout the entire electrical system.

The primary voltage at the underground transformer vault is 13,800 volts, 3 phase, 4 wire. Secondary voltage is 120 and 208 — 3 phase, 4 wire.

Installed in the main service entrance are BUSS Hi-Cap fuses; the sub-feeders are equipped with FUSETRON dual-element fuses and the lighting panels are protected by BUSS Fustat fuses.

Modern electrical protection calls for fuses because — fuses cannot be equalled by any other type of protective device for their combined high interrupting capacity, lifetime dependability and maintenance-free features.

1160

THERE'S A BUSS OR FUSETRON FUSE FOR EVERY ELECTRICAL NEED . . .

ALL LIGHTING DISTRIBUTION PANELS AND HEATING PANELS PROTECTED BY BUSS FUSTAT FUSES.

MAIN POWER PANELS PROTECTED BY 2,500 AMPERE BUSS HI-CAP FUSES
MAIN LIGHTING PANEL PROTECTED by 1,500 AMPERE BUSS HI-CAP FUSES.

ALL POWER DISTRIBUTION PANELS PROTECTED BY FUSETRON DUAL-ELEMENT FUSES.

TODAY'S INCREASED POWER REQUIREMENTS EMPHASIZE THE ADVANTAGES OF FUSES

Buss LOW-PEAK fuses;
The revolutionary new protective device

If your installation requires unusually high interrupting capacity and great current limitation plus long time-lag to prevent needless shutdowns, check into Buss LOW-PEAK fuses. Made in N.E.C. sizes from 15 to 600 amperes

Ask for BUSS bulletin LPCS.

With available fault currents reaching 75,000 to 100,000 ampere or more — *safe interruption* of fault currents is essential to guard against ruined equipment, fire hazard and personal injury.

Fusetron dual-element fuses meet todays' demand for safety. They have an interrupting rating of 100,000 ampere rms symmetrical — and for protection of mains or circuits above 600 amperes, BUSS Hi-Cap fuses are designed to safely interrupt 200,000 ampere rms symmetrical.

And fuses remain safe and accurate through the years. They require no expensive maintenance or recalibration — they are always ready to function the instant trouble occurs.

For more information on:

Buss FUSTAT fuses . . . . . *write for bulletin SCPS*
Fusetron dual-element fuses . . . *write for bulletin FIS*
BUSS Hi-Cap fuses . . . . . *write for bulletin HCS*

Bussmann Mfg. Division, McGraw-Edison Co. **University at Jefferson, St. Louis 7, Mo.**

To learn how an Aardvark licks termites... call in a *ZOOLOGIST*

(specialist on animals)

A native of Africa, the AARDVARK is a large, nocturnal, burrowing mammal subsisting largely on termites and has a long extensile tongue for gathering them. He has heavy claws for ripping open rotten logs to find more termites.

To learn how to lick welding problems... call in *LINCOLN*

(specialists in arc welding)

A VIRGINIA manufacturer of underground gasoline storage tanks needed to cut his welding costs . . . his highly competitive industry being plagued with low profits.

Although they were already using the LINCOLN automatic submerged arc process, the LINCOLN Field Engineer was able to show this company how to eliminate 25% of their welding labor. He switched them to the new LINCOLN vapor shielded INNERSHIELD process.

Now the 4000-gallon tanks, fabricated from 3/16" steel, are welded at 90 inches per minute . . . with three men doing the job formerly done by four. Thus, reduced labor costs have substantially increased the profit margin.

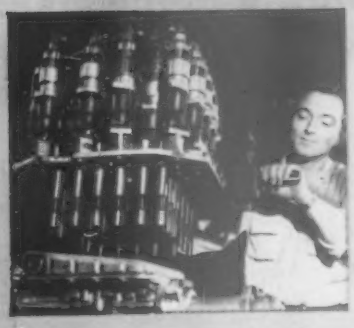
In addition, when this manufacturer licks a rolling and fit-up bottleneck, the three weldors will be able to almost double their present output with no additional help.

That's why we say it's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a "plus" at no charge.

THE LINCOLN ELECTRIC COMPANY
Dept. 1850 • Cleveland 17, Ohio

LINCOLN WELDERS

Fastener driving is our business..



UNIFORM...FAST...ACCURATE

SCREWDRIVERS AND NUTRUNNERS

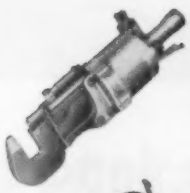
Air and electric models with conventional or "one-shot" torque control clutches—reversible or non-reversible—selection of handle styles—for threaded fasteners from #4 to 5/8" diameter.

IMPACT WRENCHES

Air and electric models with conventional and torque control clutches—reversible—selection of handle styles—for threaded fasteners from 1/4" to 3/4" diameter.

MULTIPLE NUTRUNNERS

Air-operated units custom designed for simultaneous installation of two or more threaded fasteners—with direct drive or "one-shot" torque control clutch—for fasteners from #4 to 3/4" diameter.



COMPRESSION RIVETERS

Air, hydraulic and air-powered hydraulic models—portable or stationary—for ferrous or non-ferrous, solid or tubular rivets from 1/16" to 1 1/4" diameter.

NAIL DRIVERS

Air-operated models for 4 penny to 60 penny straight or threaded shank nails.

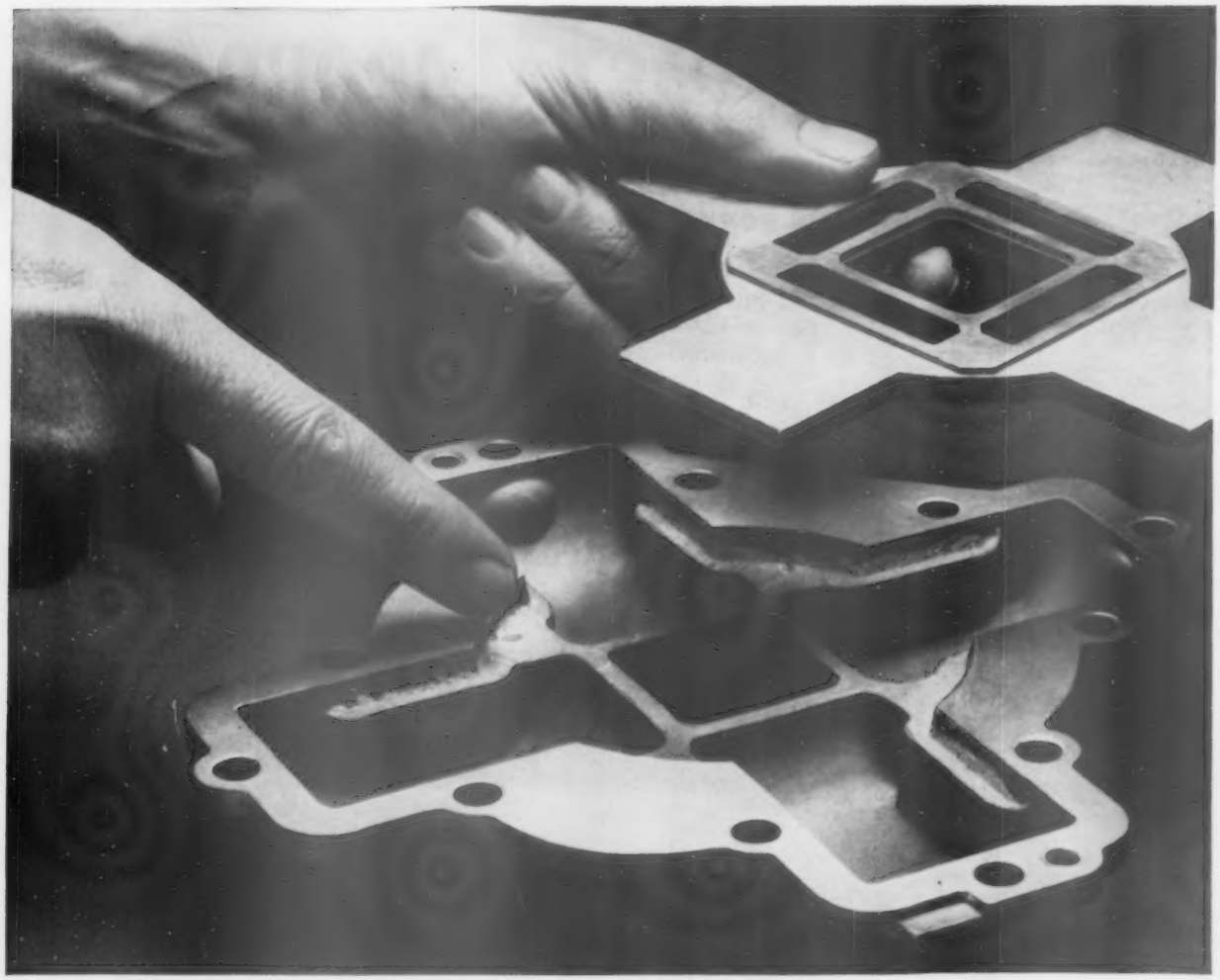
RIVETING HAMMERS

Air-operated models in wide variety of handle styles—for ferrous or non-ferrous rivets from 3/32" to 1 1/4" diameter.

Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

For more facts Circle 406 on Reader Service Card



SEPARATE CASTINGS, bonded together in areas indicated, form complete complex casting shown on the right.

Cut rejects! Fabricate complex castings with

Now you can simplify production of hollow castings —and end costly rejects by casting them in sections, then bonding the sections together with high-strength SCOTCH-WELD Structural Adhesives, such as EC-1386!

By so doing, you eliminate the high rejection rate that often accompanies sand molding. You eliminate the costly machining and equipment required for mechanical fastening. You eliminate the wasteful, space-consuming bosses or flanges.

All you need is a flow gun and an oven. EC-1386 is a 100% non-volatile liquid and is solvent free. Thus, waste is negligible; no pre-drying is required before joining the sections. The adhesive bond can be cured to high ultimate strength quickly in an air-circulating oven (one to two minutes at 500°F. bond line temperature). And the cured bond can be machined for final touch-up operations. EC-1386 also serves to fill in voids, so that parts need not be held to close tolerances.

See how EC-1386 can help you cut costs, simplify and speed production and improve product quality. And learn how other 3M Adhesives are helping the metalworking industry. Contact your 3M Field Engineer. Or write: AC&S Division, 3M Company, Dept. SBFF-110, St. Paul 6, Minnesota.

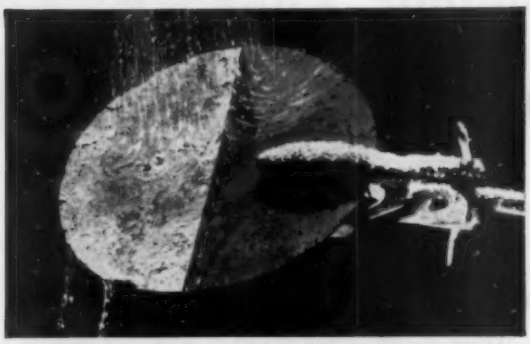
"SCOTCH-WELD" and "CORO-GARD" are Reg. T.M.'s of 3M Co.

SCOTCH-WELD®

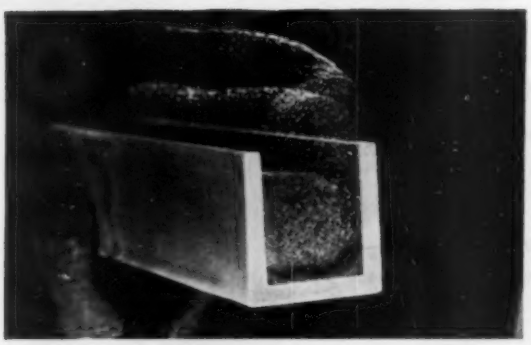
BRAND STRUCTURAL ADHESIVES

COLD SANDWICH BONDING. 3M Adhesive EC-1357 makes it possible for you to bond sandwich panels with a nip roller or cold press. You need no clamps or heated presses to complete tough core-to-skin bonds that resist moisture and high and low temperatures. This one adhesive bonds a variety of materials quickly, economically. Its dark color absorbs infrared heat quickly, dries fast.

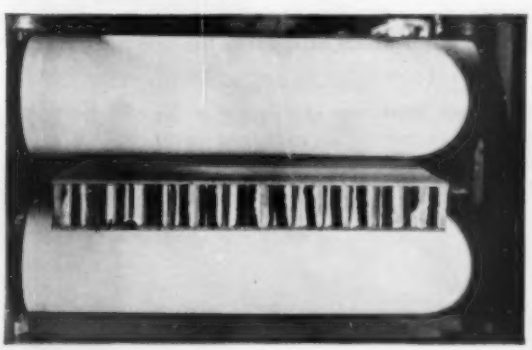
News about other 3M products



CORROSION RESISTANT COATING. CORO-GARD® 1706 Brand Protective Coating resists corrosive fluids and fumes, water and abrasion. It passed these torture tests: 2000-hour corrosive salt spray attack; 20-week submersion in 20% solution of hydrochloric acid; 6-month weather exposure in Miami, Florida. For steel, aluminum, wood, concrete, cloth, even some plastics.



SURE WAY TO SEAL. 3M Heat Expandable Sealers expand up to 125% under the normal heat of a paint-baking cycle, cure to a tough, flexible mass that keeps out dirt, water and weather, completely seal even the most irregular gap or seam. The unexpanded solid is also efficient as a gasket replacement sealer, flange sealer and for other sealing jobs.



ADHESIVES, COATINGS AND SEALERS DIVISION

MINNESOTA MINING AND MANUFACTURING COMPANY

...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

Carrier Hermetic Reciprocating Liquid Chilling Packages can help you cool your plant economically and dependably

Whether your cooling requirement is the air conditioning of a small plant, a large factory, or refrigeration for product processing, there is a Carrier Hermetic Reciprocating Liquid Chilling Package to offer you the most economical and dependable source of chilled water with the capacity you need.

There are several reasons for this. One, these units are completely packaged. Another, all components are engineered, assembled and tested at the factory. This results in reduction in space requirements, weight, and installation costs. At the same time a perfectly balanced refrigeration cycle which assures a high operating efficiency and maximum power economy is produced.

There is a size to fit your particular requirements. Units for evaporative-cooled, air-cooled, or water-cooled condensers are available in capacities from 5 to 125 tons. For more information, call your Carrier distributor listed in the Yellow Pages. Or write Carrier Air Conditioning Company, Syracuse 1, New York.

Pre-engineered—Pre-engineering of entire refrigeration cycle gives assurance that all system components are properly matched and balanced. The result: remarkable savings in space and weight as well as greater operating efficiency.

Compact design—Pre-engineering plus parts standardization makes for units of unusual compactness permitting installation where space is critical. Model 30HH, for example, will easily pass through any standard 31-inch doorway.

Low installation costs—No costly on-the-job delays with these units! Completely packaged with all components, they are delivered to your job site ready for immediate installation.

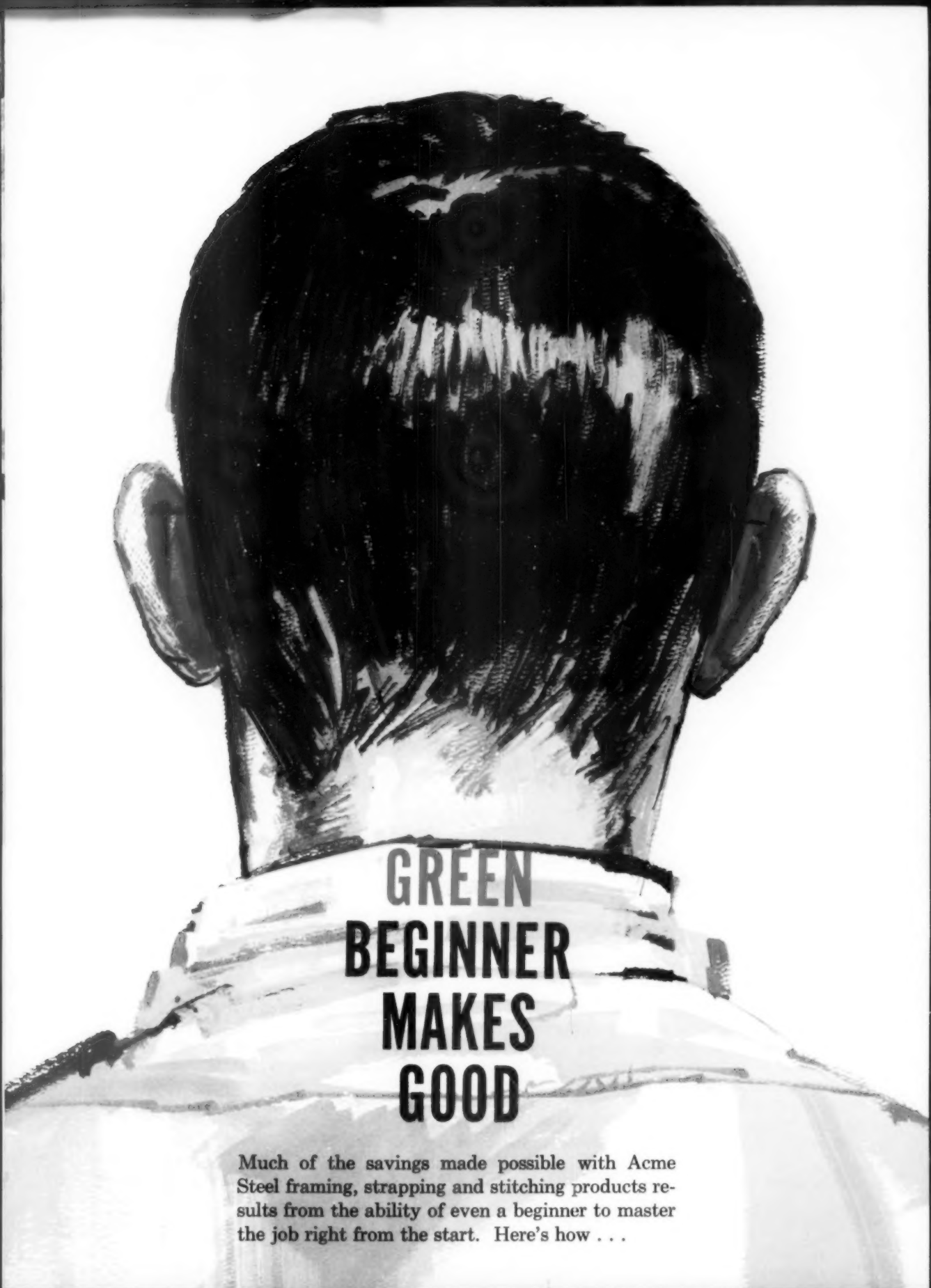
Protective controls—To insure dependable operation, various safety devices are built into the units. For example, every model includes a low-temperature protective mechanism which safeguards the unit against troublesome "freeze-up."

Carrier model 30HH—one of a family of the most compact, completely packaged liquid chillers ever offered. Available in 15, 20, 25, 30 and 45 ton models—with or without condensers.

Carrier Air Conditioning Company
A DIVISION OF CARRIER CORPORATION

For more facts Circle 408 on Reader Service Card

For more facts Circle 409 for Framing, 410 for Strapping, 411 for Stitching ➤



GREEN BEGINNER MAKES GOOD

Much of the savings made possible with Acme Steel framing, strapping and stitching products results from the ability of even a beginner to master the job right from the start. Here's how . . .

ERECTS racks and structures just using a wrench

The secret behind this fastening ease is not the man, it's the material—AIM Brand Slotted Angle. This all-purpose steel framing is simply snipped to size with a cutter and bolted together. Anyone can master it in minutes—over half the work is already done. No sawing, drilling or welding . . . no figuring and fussing to make pieces fit. AIM Brand's exclusive pattern of precision slots and holes aligns perfectly every time. You name it, AIM Brand will frame it—storage racks of all kinds, platforms, stairways and mountings . . . conveyors, cages, tables and carts . . . even packaging. AIM Brand Slotted Angle is available nationally. Ask your local distributor for full facts. And also get details on new AIM Brand Rack—the first and only heavy duty storage structure that refuses to be pulled, bulled or jarred apart!

ACME STEEL

IDEA LEADER IN FRAMING

AIM BRAND

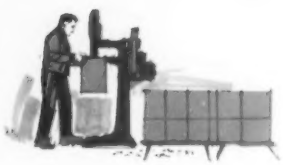
STRAPS containers as fast as production fills them

It's no trick for even inexperienced hands to keep pace with production right from the start—with Acme Steel strapping methods. They include industry's broadest and easiest to use line of automatic and manually operated steel strapping equipment to ease and speed closing, tying, unitizing, bundling, baling, bracing and reinforcing any size or shape package or product. Your local Acme Idea Man can be particularly helpful in coordinating your packaging system with your production for smoother flow, greater volume. He works with firms in every type business. Have him show you actual case studies which illustrate in detail how major companies in your field use Acme Steel Strapping—not only to increase packaging productivity, but to achieve a new high in shipping security.

ACME STEEL COMPANY · 13515 Perry Avenue · Chicago 27, Illinois

ACME STEEL

IDEA LEADER IN
STRAPPING



FASTENS boxes or products at split-second speed

How come a beginner can achieve consistently high output in closing boxes or assembling products with Acme Steel Wire Stitching? Simple. Acme Steel Wire Stitching Machines do all the work—automatically measure exact amounts of wire from a continuous coil . . . cut it . . . form it into proper size staples . . . drive them quick as a wink. Thousands of units can be stitched without a pause for reloading.

Full facts on the many money-saving advantages of this modern-day method are as close as your nearby Acme Idea Man. He will explain in detail how Acme Steel Wire Stitching can help you produce better packaging, better products, better literature binding faster at lower cost—with methods perfected and proved by the world's only manufacturer of complete lines of stitching machines and wire.

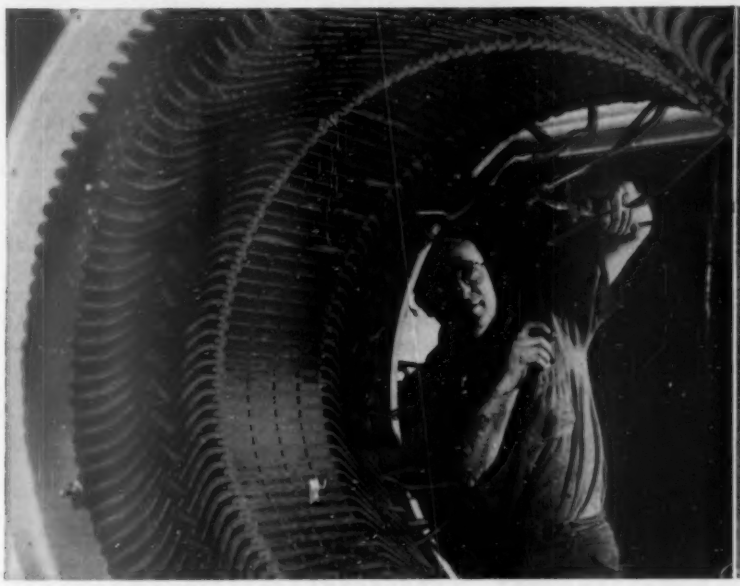
ACME STEEL COMPANY · 13515 Perry Avenue · Chicago 27, Illinois

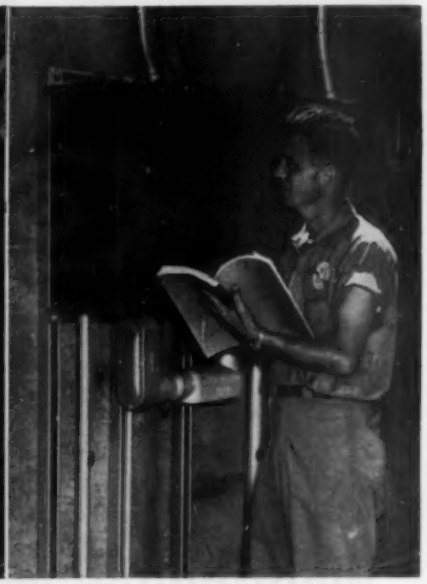
ACME STEEL

IDEA LEADER IN STITCHING

SILICONE NEWS from Dow Corning

The Current Revolution





Silicone Insulated Equipment Brings Economy, Flexibility

Chances are you've heard of the current revolution in electrical equipment . . . of outdoor motors stripped of weatherproof housings . . . of motors that laugh at overloads . . . of smaller, lightweight transformers that put power right where you want it.

These developments typify three phases of today's growing trend toward electrical equipment that's more reliable and easier to install . . . less expensive initially and in the long run.

Phase I — Self-Protecting Insulation Cuts Motor Costs

Motors need no costly enclosures . . . even outdoors . . . when they've got self-protecting insulation systems. The insulation system itself, when made with Silastic®, the Dow Corning silicone rubber, shrugs off weather, humidity, corrosion . . . is no longer the "weak-link" to be coddled. Result: There's no need for the elaborate enclosures that push motor prices out of sight. Open motors do the job — costs are cut as much as 50%! Proof: One firm saved $28,000 on only three motors by specifying silicone insulated open motors rather than totally-enclosed fan-cooled units.

Phase II — Increased Service Factor Motors Reduce Power Costs

Motors with insulation systems that don't get "burned-up" when asked to carry overloads . . . that's one way of describing motors built with Dow Corning Silicones for extra service factor. When the going gets rough and production schedules are critical, they carry overloads of twenty-five to fifty percent beyond nominal rating . . . without distressing smoke signals. And though they deliver more horsepower when needed, they're still no bigger than their conventional counterparts . . . have the same nameplate horsepower rating. Result: You specify motors to match load, let silicones carry the overloads. No need for larger, more expensive motors just to handle occasional overloads . . . and you gain in reliability, too.

Phase III — Silicone Insulated Transformers Give Power Where You Want It . . . At Less Expense

New dry-type transformers insulated with silicones contain no toxic or flammable liquids. They're smaller, lighter . . . don't require expensive vaults or barriers. Result: Silicone insulated transformers are easier to handle, easier to install, can be located right at load or load center, need almost no maintenance. They save on costly low-voltage cable, too. You get greater flexibility of the distribution system and cut costs at the same time.

KEEP PACE WITH THE BIG CHANGE

Send today for the booklet, "Specify Silicone Insulated Motors and Transformers and Save", and get the full story on the current revolution in electrical equipment. Address Dept. 3611.

SPECIFY Dow Corning Silicones and **SAVE!**

first in silicones

Dow Corning CORPORATION

MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts Circle 412 on Reader Service Card

MODERN MAINTENANCE

IS PROFITABLE MAINTENANCE

R. L. Kirkpatrick, *Manager, Maintenance Sales*, Westinghouse Electric Corporation

What Do Your Maintenance Dollars Buy? Repairs Only... or Research Advances As Well?

Repaired equipment often beats its original performance. Why? Because large manufacturers like Westinghouse pass on to you the latest equipment improvements sparked by their research dollars. They make sure that repair facilities have engineering and quality control *in depth*.

If you judge solely on the basis of your repair bill, you may never know that your maintenance dollars could also include research advances. You can get radically new components, materials and techniques for your repair dollars that will lengthen operating life and cut your maintenance costs.

Building-in the findings of research means that your equipment is more than just repaired—it is modernized for maximum performance. This often means that your equipment can be rebuilt to work even better than when it was new. The latest advances in tech-

Westinghouse rebuilds "hopeless" motor

Repairs Save Customer Both Time and Money

It was a mess—this 720-hp motor serving a large steel company. Shaft shot. Armature damaged. Commutator gouged. Windings sprayed all around.

The accident occurred when a circuit breaker serving the motor jammed mechanically—failing to open when the motor lost its field.

Westinghouse maintenance experts from the St. Louis Repair Plant checked the motor carefully, decided that although the damage was extensive the motor could be economically rebuilt and put back in service in less time than replacement by a new motor. Meantime, a new Westinghouse motor, similar rating, recently delivered for a new mill, was pressed into temporary service to minimize down-time losses.

Westinghouse restored the motor to first class operating condition. Time required—a short 14 weeks. Savings to customer—estimated $11,000.

BEFORE: This sight greeted Westinghouse service engineers—a motor that apparently would never run again.

nology and engineering are incorporated in the maintenance service you receive—because large manufacturers are interested in your business in total, not just the immediate job on hand. They know that service and integrity go together—whether you buy new apparatus or need specialized service to maintain production equipment. It is imperative that they give you the latest, most modern and most reliable equipment.

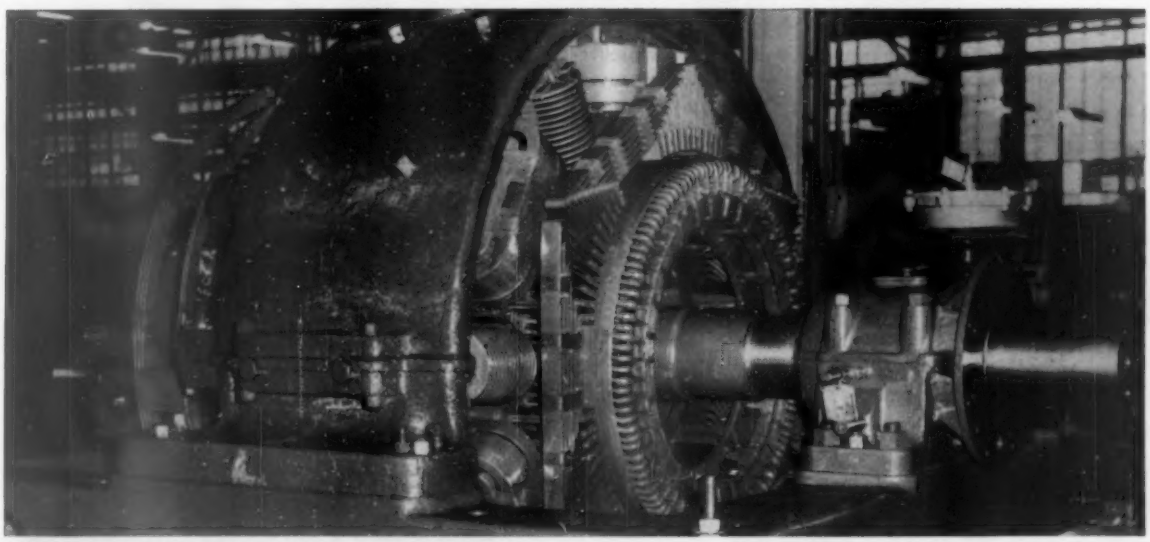
Millions of dollars are spent annually to solve equipment operating problems—to keep your equipment more reliable and on line with minimum down time. The tortuous testing of hundreds of materials (including devising the tests themselves) is constantly going on, to search for better materials and more economical ways to answer industry's needs.

Research often starts with maintenance because severe operating conditions put equipment to the supreme test. There is great advantage in working with a company experienced in solving problems under the many different conditions and in locations where they occur—even internationally. Knowledge gained in solving a particular maintenance problem becomes part of the sum total of experience that is applied to solving problems in *any* industry. It also leads to new products or equipment innovations that eliminate similar difficulties in the future.

A regular, planned schedule of modernization and repair—carried on in cooperation with a company such as Westinghouse—assures you of receiving the benefits of their research. Your equipment comes back to you with extended life that cuts maintenance costs . . . to help keep you producing profitably.

This is one of a series of Westinghouse articles on profitable maintenance practices.

—makes it better than when new



AFTER: The 720-hp motor, rebuilt and modernized by Westinghouse craftsmen, is now ready to go back on the line.

Westinghouse Maintenance Services —a Phone Call Away

Wherever you are, Westinghouse Maintenance Service is nearby, ready to work with you in the repair and modernization of your equipment—around the clock if necessary. In any industrial area of the country, you'll find Westinghouse Repair Plants, Renewal Parts Warehouses and Field Engineering Offices.

Your Westinghouse representative will show you how this fast, dependable, money-saving service can expedite your modernization and repair schedule . . . and he will assist you in setting up such a schedule. Call him . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. You can be sure . . . if it's Westinghouse. J-95219

Westinghouse

BECAUSE YOUR TEST NEEDS ARE DIFFERENT!

...from MAGNAFLUX you can find many engineered nondestructive test systems*, to meet widely different needs...as near as your telephone.

Only the widest *range* of test systems can assure you of getting the one *best* answer to your own "different" test problem. Several examples of the many ⋈ tests are shown at work on the next page.

The intensive problem-knowledge of the Magnaflux Field Engineer goes to work for you immediately. He qualifies as an impartial, expert counsel because he has thorough training in practically all wide-used nondestructive test systems. (Actually, we offer scores of systems, methods, test services, instruments and custom-engineered units. Magnaflux originated most of 'em and has been improving them ever since.)

Further, he wires you into more nondestructive testing know-how than you're likely to find anywhere else. He's backed, for instance by many hundreds of man-years of experience in field application and of design and project engineering. *Plus* a big department-full of far-reaching research. *Plus* the up to the minute knowledge gained in operating our own fifteen Commercial Testing Centers in principal cities, where the "unusual" tests occur almost daily to meet hundreds of differing needs and specifications.

At Magnaflux you find maximum nondestructive testing assistance—in equipment, men and experience-based understanding of your needs and problems. May we put it all at your service—SOON? Phone your local Magnaflux Field Engineer, or write us. Magnaflux Corporation, 7316 W. Lawrence Avenue, Chicago 31, Illinois.

TESTING BEARING CAGES with ZYGLO fluorescent penetrant. This Zyglo ZA-49, equipped with an endless conveyor, provides mechanized, high volume testing of nonmagnetic parts from ¼" to 10" in diameter. All processing is fully automatic, assuring predetermined control and repeatability of results.

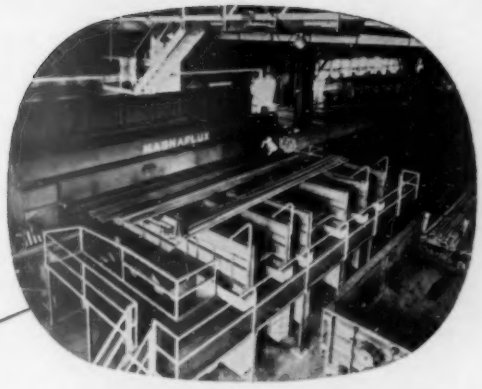
MAGNAFLUX CORPORATION

TEST SYSTEMS

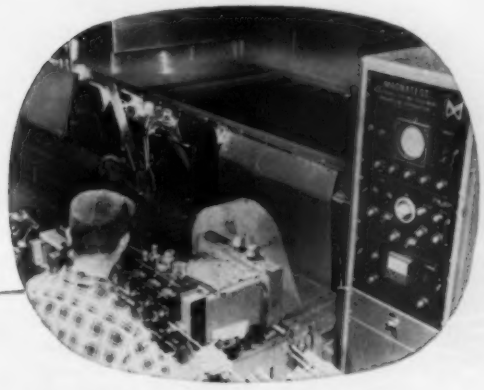
A SUBSIDIARY OF GENERAL MILLS

*MX test systems include MAGNETIC PARTICLE, FLUORESCENT PENETRANT, THERMOGRAPHIC, EDDY CURRENT, ULTRASONIC, STRESS ANALYSIS, RADIOGRAPHIC TESTING, DYE PENETRANT & MAGNETIC FIELD

A Few of Thousands of ⋈ Test Installations at Work—Could One of Them Help You?

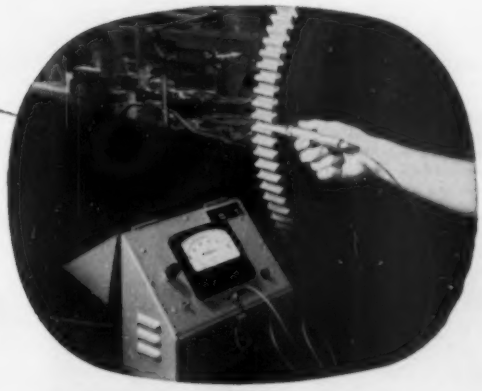


BILLET CONDITIONING SYSTEM
Mechanized, ⋈ engineered inspection and handling provides more control, better quality level, and lower costs from conditioning. MAGNAGLO, electronic eddy current, ZYGLO fluorescent penetrant testing, for billets, tube rounds, welded and seamless tubing and pipe.



TESTING COPPER TUBING ELECTRONICALLY
with MAGNATEST FW-400, for cracks and seams at production speeds. Many kinds of MAGNATEST instruments, hundreds of applications: determining metal properties, defects, characteristics, sorting, etc.

TESTING THICKNESS ULTRASONICALLY
for core shift of castings, or almost any solid material, from .025″ to 3.00″, for thickness, corrosion, etc., from one side only. Portable transistorized SONIZON SO-300 gives instant dial readings, accurate to ±1%. Magnaflux Field Engineer instructs in operation (above).



TESTING JET ENGINE
turbine wheels electronically for serration cracks, with MAGNATEST ED-500G, eddy current instrument. Magnatest units measure relative depth of cracks, electrical conductivity, evaluate metals for all sorts of basic or process-built characteristics.

RADIOGRAPHIC TESTING
of boiler tubes with gamma radiation isotope. X-ray and gamma radiography service available at several locations. Performed by certified technicians and engineers at your plant or at your local ⋈ Commercial Testing Center.

©1960, Magnaflux Corporation

MAGNAFLUX, MAGNAGLO, ZYGLO, ZYGLO-PENTREX, BONDCHECK, MAGNATEST, SONIZON, STRESSCOAT AND SPOTCHECK ARE U.S. REGISTERED TRADEMARKS OF MAGNAFLUX CORPORATION

20 TON CRANES FLY AIRCRAFT SECTIONS IN CEILING

Lowering the tail boom of a large airplane into place. These huge units must be handled with extreme care and inched gently into exact position for matching of holes. The Cleveland Tramrail cranes used here are of the transfer type and carry loads to 20 tons.

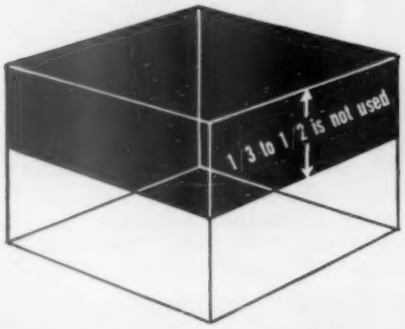
40-FOOT TUBES HANDLED FAST IN CEILING

5 ton Tramrail cab-operated transfer cranes move tubes at 300 f.p.m. to all points in this 58,000 sq. ft. room. To convey the tubes from bay to bay with floor trucks would be awkward, slow and require considerable valuable floor space. The two hoist hooks are 16 feet apart and have a lift of 30'-0".

LOOK TO YOUR CEILING

For Big Savings

1/3 to 1/2 the cubic space in the average plant is NOT USED



MANY plants are pinched for floor space, yet are not using a large part of their cubic footage. Much of their large ceiling space is wasted.

By moving all equipment and activities possible from floor to ceiling, many square feet of floor are freed for the addition of production machinery without plant expansion for needed storage areas and other requirements.

Aisleways can be reduced in size or completely eliminated. Machines can be moved closer together. Floor areas used for local stocking can often be done away with.

Materials handling is an operation that can be carried on efficiently overhead. Cleveland Tramrail equipment is handling vast tonnages of materials in the ceilings of thousands of factories and warehouses. Not only do Tramrail cranes and track systems save tremendous areas of floor space, but they speed handling, lower production costs, often by fantastic amounts, and greatly aid safety.

We welcome an opportunity for a Cleveland Tramrail materials-handling engineer to give you the details.

Write for free Engineering and Application Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3232 E. 290 ST. • WICKLIFFE, OHIO

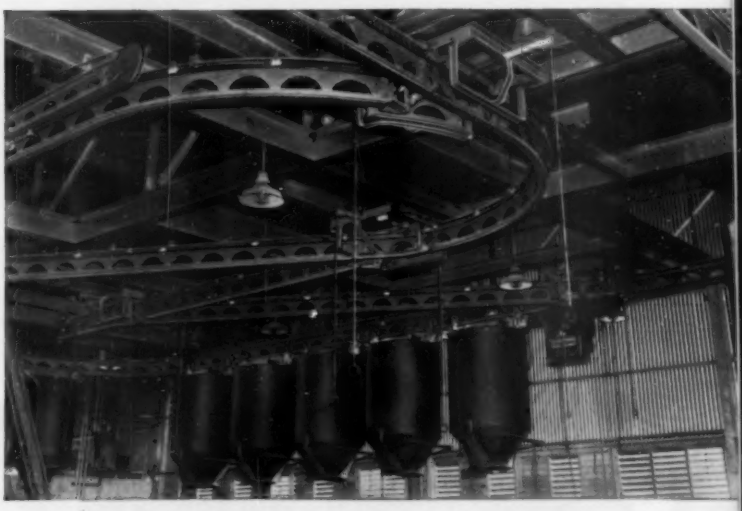
TRAMRAIL CRANES PERMIT LOWER HEIGHT OF CEILING

Both ordinary top-running and Tramrail under-running cranes were considered when this Diesel Repair Shop was planned. Two 5 ton, 63'-0" Cleveland Tramrail cranes were installed. Among other advantages, they enabled a lower building height. This shop is thought to be the finest and most modern of its kind.

TRACTOR PLANT PROFITS BY USING CEILING

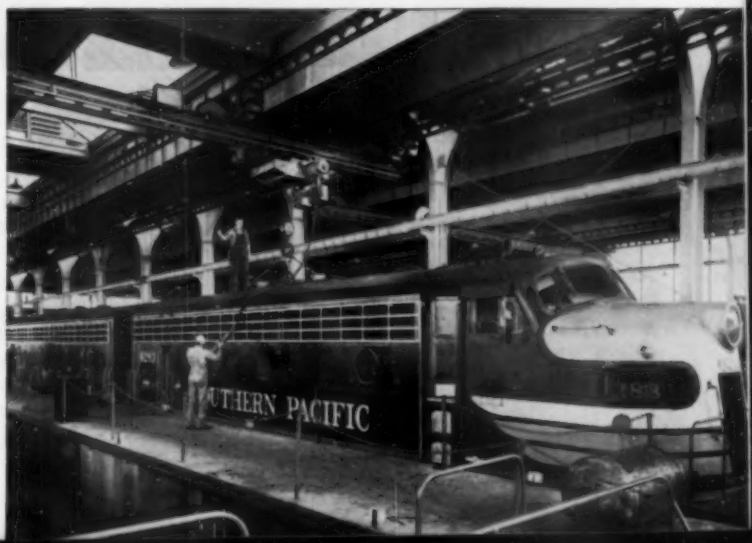
Heavy materials can be moved quickly, easily by one man in every square foot of a plant covered by Cleveland Tramrail cranes.

Some 250 cranes, like those illustrated, eliminate waste time waiting for a lift in this efficient plant.



TRAINS OF BUCKETS CONVEYED IN CEILING

Buckets of materials can be conveyed on Tramrail track and switch system in ceiling by powerful tractor. Control can be automatic if desired. Each bucket in train illustrated has 45 cu. ft. volume and 4000 lb. capacity.



Seven SIGNODE ways to strap better for less ...at the speed you need

Basic two-piece tool set; easy to use. An inexpensive outfit, including seals, strapping, strap dispenser, stretcher and sealer, saves time and money in any shipping room.

Model N air-power stretcher tightens strapping to preset tensions up to 1600 pounds. Model PN, not illustrated, straps bundles of round or irregular shape.

Signode's SFC—the only one-hand, one-piece strapping tool—shown here with Signode Adjusta-Pak three-way-telescoping corrugated container.

Model AP portable air-power strapping machine—a fast, dependable air-powered tool that tensions, seals, cuts off strap. Preset tensions up to 1600 lbs. Also electric—Model AE.

Model PSF, Power Strap Feeder—now one man straps big packages without a helper and without walking around the package. Inexpensive. Used with any Signode seal feed tool.

Conveyor strapping station holds interlocking container flanges, positions strapping, supports tools, saves time and labor. Handles large-volume flow of various size cartons.

Model M-2 power strapping machine automatically tensions, seals and cuts the strapping. Speeds and improves conveyor line strapping of all types of containers.

It will pay you to see the Signode man near you. He has strapping tools, machines, and accessories to meet your requirements, and can help you with time-saving, cost-cutting packing and strapping methods. For fast service, write, describing your needs to.

First in steel strapping

SIGNODE STEEL STRAPPING CO.

2663 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
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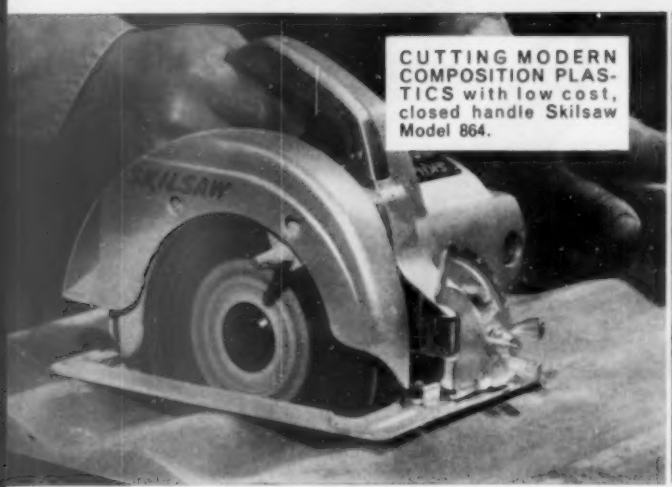
CUTTING STAINLESS with high speed, top handle Skilsaw Model 857 and aluminum oxide cut-off wheel.



CUTTING MODERN COMPOSITION PLASTICS with low cost, closed handle Skilsaw Model 864.

CUTTING ALUMINUM with extra powerful, rear handle Skilsaw Model 77 —world's best known power saw.

Skilsaw power saws cut everything...

thinnest plastics to diamond-hard alloy steels

Equipped with one of 20 specialized cutting blades, a Skilsaw power saw will cut the following materials quickly, easily and at low cost:

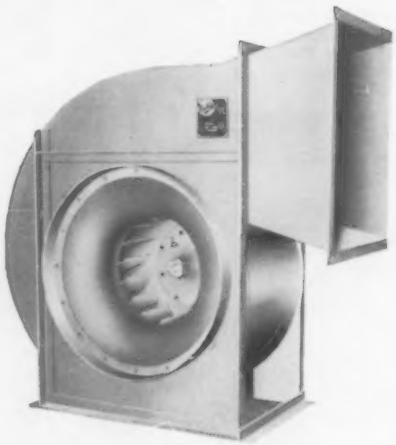
High speed steel • Aluminum • Cast iron • Asbestos cement • Lead • Woods • Brass • Plastics • Copper • Ceramic Tile • Concrete • Stone • Rubber • Laminates

Power packed, dependable Skilsaw Power Saws are the world's best known, most used portable power saws. World's most complete line, too . . . select from 4 styles, 18 models in all!

Your Skil distributor can help you select the right model saw and blades for your cutting requirements. Look under "Tools-Electric" in the Yellow Pages. Or for full information, write: Skil Corporation, 5033 Elston Avenue, Chicago 30, Ill., Dept. 117K.

SKIL ...AND SKILSAW POWER TOOLS

Realize the Lower Cost of Quality Fans



"Buffalo" Type "CR" Fan

"Buffalo" Type "BL" Fan

"Buffalo" Industrial Exhauster

Without a doubt — the dependable performance of quality built fans pays off in longer, more effective, trouble-free service. At Buffalo, we call this the "Q" factor . . . the highest quality you can get. Here are 3 examples of what this can mean to you . . .

For supplying moderate pressure ventilating, air conditioning and air cleaning systems, the "Buffalo" Type "BL" Fan is ideal. From inlet through wheel to housing, the "BL" is engineered for quiet, efficient, economical operation. The "Buffalo" designed non-overloading characteristic assures stable output from free delivery to shutoff. Buffalo's traditional durable construction assures long, maintenance-free life. Capacities to 500,000 cfm. Write for Bulletin F-104.

For severe industrial service the "Buffalo" Type "CR" Fan is unsurpassed. Fan efficiency is increased by the same design factors that reduce wear to a minimum. A unique radial blade plus maximum streamlining through the entire fan accomplishes this dual purpose. Long, productive fan life is assured by Buffalo's extra-heavy duty construction throughout. For full details, write for Bulletin FD-205.

For rugged air and material moving jobs you can rely on "Buffalo" Industrial Exhausters. Special units will move hot gases from 200° F. to 850° F. For handling corrosive fumes, actual users prove that "Buffalo" Rubber-Lined Exhausters will outlast standard metal fans as much as twelve to one. Efficient material wheels are available for moving emery dust, saw dust, chips, long shavings and many other materials. There's a "Buffalo" Industrial Exhauster to fit your "tough" application. Write for Bulletin FI-110.

For full information on these and every type "Buffalo" Fan, call in your nearest "Buffalo" Representative. Or write us direct, outlining your air moving problems.

"Buffalo"

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

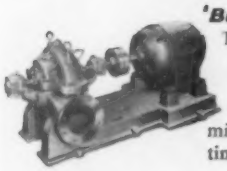
'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

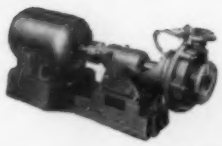
Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

For more facts Circle 418 on Reader Service Card

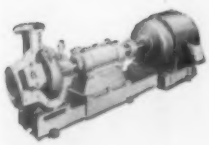
BUILT FOR THE JOB ...TO SAVE YOU MONEY



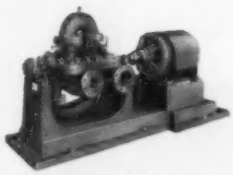
'Buffalo' Clear Water Pumps. These Double Suction Pumps are designed for maximum efficiency in clear water service. Ruggedly built for long, trouble-free life with minimum down-time. Write for Bulletin 955.



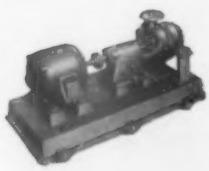
'Buffalo' Chemical Liquid Pumps. These sturdy pumps are specially engineered for punishing service in moving most corrosive, abrasive or high consistency liquids. Your choice of several types in a wide variety of trim. Send for Bulletin 976.



Non-Clogging Pumps. Move high consistency liquids efficiently and dependably. Wear and wedging are minimized. Diagonally split shell simplifies inspection. Rubber-lined units are ideal for corrosive or abrasive liquids. Full details in Bulletin 953.



High Pressure Pumps. These multi-stage pumps stand up under boiler feed and other severe clear water conditions. Designed to operate against heads as high as 1500 ft., in capacities to 900 gpm. Bulletin 980 gives complete facts.



Heat Transfer Pumps. Specially engineered to handle high temperature liquids. Huskily built with special alloys, water-cooled bearings and suitable packings. Highly efficient single suction, solid shell design. Write for complete details.

Close-Coupled Pumps. These space-saving 'Buffalo' Pumps combine high efficiency with great compactness. Since no shaft alignment is required, installation is simplified. Models for vertical or horizontal installation. Discharge is adjustable to required angle. Send for Bulletin 975.

Here's Why 'Buffalo' Pumps' *Quality* Is Your Best Economy... Resulting In *Lower Overall Cost:*

- The complete 'Buffalo' Quality Line offers the right pump for almost every liquid-moving need. Thus you pay only for the type, size and capacity required . . . no more. This can save you money from the start.

- Maximum Parts Interchangeability through standardization of parts cuts inventory costs and stocks. This, plus simplified inventory control, provides additional economies.

- 'Buffalo' Stresses Quality through and through, to insure many years of productive pump life. This is true long range economy. Rugged construction provides extended trouble-free operation. Result? Less down-time adds further economies.

- Maximum Hydraulic Efficiency is engineered into every 'Buffalo' Pump. This means more liquid moved for each unit of power. Still more economies!

Any way you look at it, 'Buffalo' Quality Pumps insure greater economy for you. Your 'Buffalo' representative will be glad to help solve your liquid moving problems. Phone him today, or write us direct.

"Buffalo" PUMPS

BUFFALO PUMPS DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canada Pumps Ltd., Kitchener, Ontario

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

Quality metal products deserve
"the finishing touch" of Mahon

another
example . . .
fine office furniture from General Fireproofing

below: one of GF's new 1000 Series desks, part of a striking, new functionally designed business furniture line. At right: a stage of the complete finishing system designed and built by Mahon for GF's San Luis Obispo, Calif. plant.

Production finishing is the application of coatings of a specified quality at highest efficiency .That also sums up the business of Mahon's Industrial Equipment Division and they have learned it well . . . for over forty years . . . in hundreds of installations . . . for all types of finishing. Mahon metal-cleaning and metal-finishing systems will prove your best investment regardless of initial cost. In this highly specialized, multi-process area, can you afford less than the best for your quality products? Find out how Mahon's 'finishing touch' can improve your products . . . your costs . . . your sales. Call in Mahon.

WRITE FOR MAHON CATALOG A-660
ALSO IN SWEET'S P. E. FILE

MAHON INDUSTRIAL EQUIPMENT

- Finishing Systems
- Metal Cleaning Equipment
- Painting Facilities—spray, dip and flo-coaters
- Drying and Processing Ovens
- Special Plant and Production Equipment

YOUR BIGGEST VALUE IS IN MAHON'S PLANNING & ENGINEERING EXPERIENCE

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, San Francisco and Torrance.

MAHON

For more facts Circle 420 on Reader Service Card

LINK-BELT GEARMOTORS . . .

cool-running!
quiet!
compact!

Where inches count . . .
LINK-BELT Gearmotors
make the most of mounting space

If you're after (1) high-efficiency speed reduction (2) performed in close quarters—look no longer. You get the best of both with Link-Belt Gearmotors.

• COOL-RUNNING—due to precision-cut, hardened gear trains that minimize friction.
• QUIET—a result of smooth-meshing gears and cast-iron, one-piece housing.
• COMPACT—because of simple gear trains and flange-connected motor that requires no additional coupling devices.

Available in double, triple and quadruple reductions—ratios from 6.2:1 to 985:1 . . . up to 100 hp.

FOR FULL-LINE FACTS

on Link-Belt's comprehensive line of speed reducers—contact your nearest Link-Belt office or authorized stock-carrying distributor . . . or check and send this coupon to Link-Belt Company for data on all or any combination of the following:

- ☒ gearmotors—Catalog 2747
- ☐ motogears—Catalog 2747
- ☐ helical gear speed reducers—Catalog 2751
- ☐ shaft-mounted speed reducers—Catalog 2618
- ☐ worm gear speed reducers—Catalog 2324-A
- ☐ universal worm gear speed reducers—Catalog 2724
- ☐ parallel shaft speed reducers—Catalog 2619
- ☐ fluid drives—Catalog 2747
- ☐ P.I.V. speed changers—Catalog 2274

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15,112

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HOW PUROLATOR HELPS SOLVE THESE FOUR COMMON IN-PLANT FILTRATION PROBLEMS

Proper filtration means reduced wear, longer life and increased efficiency for most types of machinery. It also means higher quality manufactured products because of contaminate-free process fluids.

As the world's largest, most-experienced maker of filters, Purolator has over 2,000 standard filter units available. Standard Purolator filters solve these filtration problems. Chances are, they will also solve yours. If not, Purolator will design — and make — filters that will. See your nearby Purolator distributor, or write: Purolator Products Inc., Rahway, New Jersey.

PROBLEM: Contamination of Bulk Fluids and Semi-Fluids Before Packaging. Despite rigid precautions, various contaminates can enter bulk fluids during processing. These contaminates may be: oxides from pipe corrosion; water from evaporation in storage tanks; tiny metal chips from machinery; or foreign matter picked up from the atmosphere.

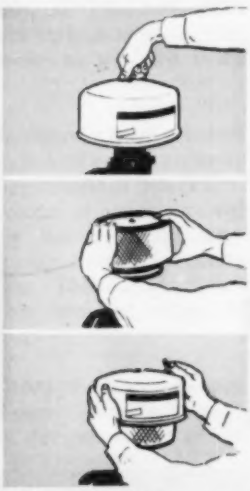
SOLUTION: Purolator Model G-141J Metal Edge Filter is ideal for filtering most bulk fluids just before packaging. These fluids might include: inks, varnishes, food products, greases; process fluids, or lube and fuel oils.

The G-141J's filter element is permanent . . . made of precisely-spaced metal ribbon wound into cylinder form. Capacity ranges from 6 to 200 GPM. Filtration . . . from 25 to 500 microns. Installation can be made on either pressure or suction side of pump. If desired, filter is also available in stainless steel.

Continuous, Permanent Filtration. Cleaning the G-141J is simple, too. No need to disassemble the unit or stop the flow of fluid. Turning handle rotates metal edge filter unit against fixed knife-blade which shears off waste. This is periodically removed through plug at bottom. If service warrants, filter element can be rotated continuously by motor drive.

PROBLEM: Air-Filter Maintenance. Removing, washing and re-oiling ordinary oil-bath type air filters is a time-consuming (and expensive) chore. What's more — this type of unit is relatively inefficient. Clogs easily and then lets abrasive-laden air into the engine.

SOLUTION: Purolator Micronic filter elements can be replaced in seconds. Special accordion pleating means 9-14 feet of filter area — 10 times that of most competitors. Controlled porosity filters out particles as small as .000039 of an inch. Models up to 1,000 CFM available.



Service in Seconds. Here's all you do to service a typical Purolator Dry Type Micronic Air Filter:

1. Loosen wing nut. Remove cover and dirty refill.
2. Replace with a new Purolator Micronic refill.
3. Replace cover and tighten wing nut.

Purolator refills are inexpensive. However, filter element life can be extended by cleaning. This is done by applying reverse flow of low pressure air through element.

PROBLEM: Incomplete Filtration of Lubricating Oil. Various bleeder, bypass, shunt and similar partial flow systems often used on machine tools and large engines can cause damaged parts and excessive wear because contaminates are permitted to pass into the engine.

SOLUTION: A Purolator Micronic Filter of correct size can handle full lubricating oil flow for even the largest engines. The protection this kind of filter gives the engine exceeds anything a partial flow arrangement could accomplish.

Full-flow lube oil filtration. Pictured above is a typical Purolator Micronic Filter, Series P-32.

PROBLEM: Diverse Filter Requirements of Hydraulic Circuits. Without proper filtration, most hydraulic circuits would soon break down. Yet even a small plant has many different hydraulic circuits — each one requiring a specific type of filter.

SOLUTION: Purolator's complete line of filters for hydraulic systems is the most comprehensive of its kind. Models include: suction strainers to protect pumps; high-pressure filters to protect delicate control valves; and low-pressure filters for return circuits.

Complete line of filters for all hydraulic circuits. Here are just a few standard units. Filter media include: Micronic, metal edge and wire cloth.

Filtration For Every Known Fluid

PUROLATOR PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

YOUR BUSINESS IS IN THE BALANCE . . . and bearing failures can work against you. That's why it's important to specify New Departure ball bearings and Hyatt roller bearings for the machinery in your plant. They provide significant performance reliability, the kind of worry-free, trouble-free service that helps to cut costs and keep maintenance to a minimum. Together N/D and Hyatt are the world's largest manufacturer of bearings. With nearly 30,000 original equipment customers, they supply bearings for virtually every type of industrial equipment in use today. These high quality, durable bearings are readily available to you through the national network of N/D-Hyatt Industrial Bearings Distributors . . . who are backed up by United Motors Service bearings warehouses across the country. So when you replace bearings, be sure you get the best fast. Specify New Departure and Hyatt from your Industrial Bearings Distributor.

New Departure and Hyatt bearings are supplied through . . . U-M-S

HYATT NEW DEPARTURE

For more facts Circle 423 on Reader Service Card

FACTORY PRESS TIME REPORT • NOVEMBER 1960

Looking ahead in business

Take a deep breath: Business will begin 1961 on a low note, most forecasters are now agreed. There is convincing evidence to support this outlook.

The latest report on industrial output, as measured by the Federal Reserve Board, slipped both in August and September. For September, the index declined to 107 (1957=100), the 1960 low. This latest drop came despite a pick-up in auto production that might have been expected to send the index winging upward.

Currently, there is nothing to suggest a quick rebound in production. In the fall, industrial output normally grows in response to a swelling volume of new orders. But in recent months the volume of orders received by manufacturers generally has been declining. Producers have been shipping finished products faster than new orders appear. Their backlogs thus have declined. And they've now cut output to prevent increased inventories.

Machinery makers, for one group, don't see a pick-up in orders in the immediate future. Those included in the McGraw-Hill forecast of this area expect orders to go on declining through the first quarter of 1961. This, analysts feel, is an indication that further cuts in industrial output are in the offing.

The latest report on the Gross National Product (GNP) did little to bolster hopes for improving business in the early months of the new year. According to first estimates, this over-all measure of business activity fell off slightly in the third quarter. It had stood at a record $505-billion.

Significantly, the biggest part of the GNP decline was due to cutbacks in inventory levels. Thus, just as in the early months of this year, when additions to stocks were boosting business, decisions to subtract from inventories now are deflating the Gross National Product. With further cuts in production in view, inventory reductions are likely to thin down business volume even more.

•

Another contributor to the sluggish business pace: the decline of retail sales in recent months. Consumer durable goods have, of course, been the hardest hit. Either because they are well stocked with goods, or because they are fairly heavily laden with debts, consumers are easing up on their purchases. And, until income gains become more impressive than those of recent months, prospects of a healthy pick-up in sales of durables and consumer goods generally are poor.

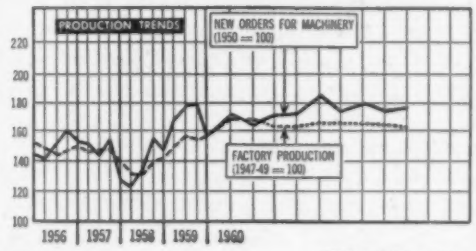
•

Finally: homebuilding activity, contrary to anticipations, hasn't revived. After a recent series of government moves to make mortgage money more plentiful, this key sector of the construction industry was expected to begin an upward swing.

It now appears a significant improvement will await the coming of spring and better building weather. Then housing should again become a plus factor in the business outlook.

Thus, although business is moving along at a relatively good clip, evidence points to modest declines, rather than gains, for the early months of '61.

FACTORY FIGURES OF THE MONTH



Indicator	SEPT.ᵖ 1960	AUG.ʳ 1960	SEPT. 1959
New Orders for Machinery (exc. elec.)[1]	175.0	174.0	175.0
Contracts for Industrial Construction[2]	179.0	149.0	171.0
Factory Production[3]	161.0	163.0	156.0
Consumers' Prices (cost of living)[4]	126.2	126.6	125.2
Industrial Prices (materials, supplies)[4]	128.2	128.2	128.4
Manufacturing Employment (millions)[4]	16.5	16.4	16.4
Total Employment (millions)[5]	67.8	68.3	66.3
Unemployment (millions)[5]	3.4	3.8	3.2

ᵖ = preliminary ʳ = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of Labor Statistics.

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THIS FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve your current operating problems. Here's how it works:

1. All major articles (set here in bold type) and many short items are classified according to a functional code.

2. Certain articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards, file by code number. To cross-index, copy information on a second card, file by secondary code.

For ways to use your Guide, write Reader Service, FACTORY, 330 W. 42nd St., New York 36.

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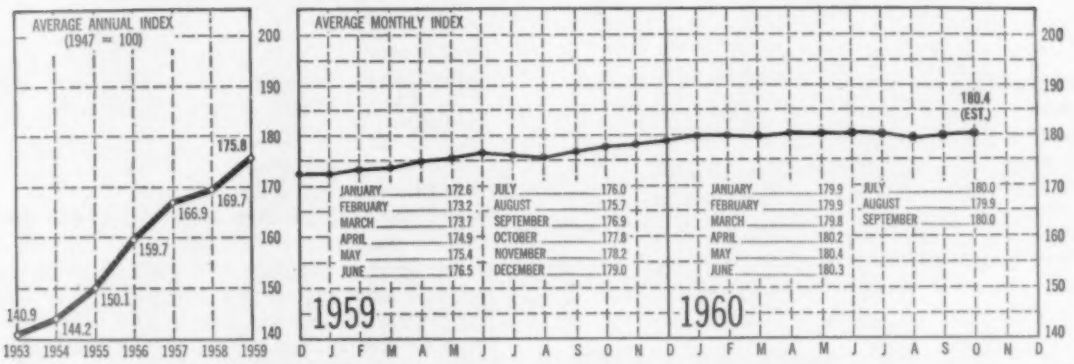
FACTORY PRESS TIME REPORT • NOVEMBER 1960

Cost index of plant maintenance



Downward trend broken

Solid jumps in the equipment sector do most to bring decline to abrupt halt.

After declining for three consecutive months, FACTORY's Cost Index of Plant Maintenance resumed its upward march in September. The Index now stands at 180.0, one-tenth of a point higher than last month.

Reason for the increase: A rise of materials prices in the equipment component. The jump overshadowed a decline of materials costs in the building and facilities component. The equipment change was further accentuated by labor costs which remained passively unchanged from August.

September brought an abrupt end to a trend of declining materials prices. The equipment section of the Index rose 0.7 of a point, more than enough to outweigh a 0.2 of a point decline in materials prices in the building and facilities sector. The price rises this month for materials used to maintain equipment were not extremely numerous, but in the main were large. For example, belting rose 4.4 points, and mechanics' hand tools rose 1.8 points to a level of 204.6 (1947 is the base year of 100).

Conversely, the prices of materials used for maintaining buildings and facilities fared quite well this month. Four materials posted declines and two rose. The combined index of all materials in that area of the index was thus down 0.2 of a point to 139.2. The four materials that posted lower prices in September were lumber, millwork, piping, and electric fixtures. On the up side, heating equipment registered a gain of 0.4 of a point and wire mesh prices moved up 2.6 points.

	AVERAGE 1959	SEPT. (Preliminary)	AUG. (Revised)
Building and Facilities Index	166.5	170.6	170.6
Materials	142.3	139.2	139.4
Brick	152.5	155.1	155.1
Elec. fixtures	129.0	131.3	132.4
Elec. switches, boards, fuses	185.6	182.1	182.1
Elec. wire, copper	138.9	148.7	148.7
Glass	152.0	142.0	142.0
Gutters, spouts, ducts	178.0	180.4	180.4
Gypsum products	140.8	140.9	140.9
Heating equipment	127.7	125.2	124.8
Lumber	134.5	125.3	126.3
Millwork	155.7	156.0	157.0
Paint	130.1	130.2	130.2
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.9	188.7	188.7
Pipe & tubing, copper	154.1	152.4	156.2
Roofing	123.7	113.2	113.2
Sanitary fixtures	155.6	161.8	161.8
Sash, metal frame trim	140.9	136.5	136.5
Solder	124.1	123.9	123.9
Steel, structural	236.3	236.3	236.3
Tanks, steel	138.0	139.2	139.2
Valves & fittings	166.7	164.6	164.6
Wire mesh	162.6	165.5	162.9
Labor	182.6	191.5	191.5
Carpenters	168.9	179.0	179.0
Electricians	191.1	199.6	199.6
Painters	187.9	196.0	196.0
Equipment Index	179.5	184.1	183.8
Materials	176.1	177.4	176.7
Abrasives	161.0	157.9	157.9
Alloys, non-ferrous	125.4	123.3	123.6
Bars & plate, steel	227.1	227.2	227.2
Bearings	164.1	155.4	155.4
Belting	157.3	163.7	159.3
Bolts, nuts & screws	225.6	223.8	223.8
Chain	184.0	192.1	184.0
Controls (electrical)	185.6	182.1	182.1
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	198.2	204.6	203.8
Lubricants	124.1	125.7	125.7
Motors	147.3	142.5	143.6
Non-ferrous metals	129.0	136.6	136.6
Precision tools	156.6	158.2	158.2
Pumps	194.8	196.6	196.6
Tools, cutting	172.4	190.0	190.0
Valves & fittings	166.7	165.5	164.6
Labor	181.8	188.6	188.6
All mfg. labor	179.9	184.4	184.4
Machine tool labor	184.2	192.7	192.7
FACTORY'S COST INDEX	175.8	180.0	179.9

FACTORY PRESS TIME REPORT • NOVEMBER 1960

Looking ahead in labor

Persistent unemployment that hangs on in manufacturing (800,000-a-month) and related industries is keeping union leaders and their membership in a turmoil. U. S. Labor Department officials describe it as "Continued weakness . . . a level that is by no means satisfactory under any standards." In the basic steel industry, 140,000 jobs have been lost so far this year. Coal mining jobs have been halved in less than 10 years while railroad employment is down to 800,000.

Coal, railroads and steel provide the hard examples of what's happening to jobs under automation. But they can also serve to illustrate what cures are being attempted and what other employers may have to face if the trend continues, as expected. Unions in all three industries have tried different approaches.

Take coal mining, the first and hardest hit. From the start, John L. Lewis' United Mine Workers have backed, and even actively promoted coal automation. This has resulted in an ever-declining but high-paid (over $25 a-day) corps of coal miners. However, a majority of miners are unemployed, forming pockets of depressed area coal region communities. Now that the strong-willed Lewis has retired, these miners are demanding greater protection from the UMW, the nation's richest union. An eruption is likely.

Rail brotherhood leaders have fought years for job protection clauses in their contracts. Current Federal policy requires the equivalent of four years pay to a rail employee who loses his job in a merger of two railroad lines. Now the unions are demanding more. In a court suit seeking to void the merger of the Erie and Lackawanna railroads, they insist that all jobs should be frozen for the four year hitch—the equivalent in pay is not enough. In doing so, the rail unions are committing themselves flatly to cutting back rail payrolls only by attrition, i.e., by simply not filling jobs of workers who retire.

In steel, David J. McDonald's United Steelworkers, in its contracts with the steel producers, agrees that jobs may be cancelled by the introduction of new machinery but now the USW is seeking to slow this down. Rather than outright layoffs, the union chiefs want to spread the work among the available work force. They'll try this, in 1962 nation-wide steel negotiations, by demanding the 32-hour week in place of the current 40 hours. This would, ostensibly, add one new job in five.

•

The Supreme Court's 1960-61 docket of labor-management cases is bigger than ever—and still growing. Nearly 50 labor cases are up for review, mostly interpretations of the Wagner and Taft-Hartley acts. The new Landrum-Griffin reform law probably won't reach the high tribunal this term, but it promises to add to the court's work load in future years.

A number of key cases are up for decision. Here are the biggest ones to watch for:

• **Machinists Union vs. Street. The issue: Union political spending.** That is, whether the union has a right to spend dues money, collected under shop agreement, for political purposes to which a union-dues-paying member objects. This involves a test of the Railway Labor Act which permits the union shop, regardless of laws, in right-to-work states where the union security clause is outlawed.

• **IUE Local 761 vs. NLRB. The issue: Plant picketing.** In this one, the test is whether the manufacturing union has the right to picket a plant gate reserved for employees of a neutral contractor. The NLRB has held that such picketing is a secondary boycott violation.

• **Weyerhauser Co. vs. NLRB. The issue: Craft severance.** It tests the NLRB's doctrine which permits craft units to break off from production unions if the craft has a history of representing such workers—except in these four industries: Basic steel, aluminum, lumber and wet milling. The board's position in denying craft severance in these industries is being challenged as discriminatory in this case.

• **Teamsters Local 357 vs. NLRB. The issue: Unlawful dues collection.** Here, the NLRB's position that dues collected under lawful union security agreements must be reimbursed by the union or employer, or both (the Brown-Olds doctrine), is being challenged. Two lower courts have divided over whether this is a proper remedy.

SEE LABOR RELATIONS NEWS, PAGE 184

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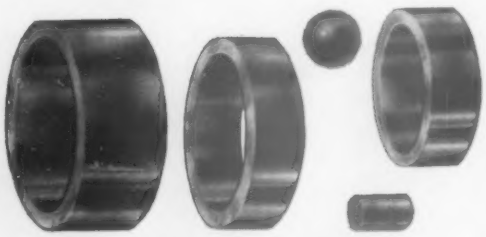
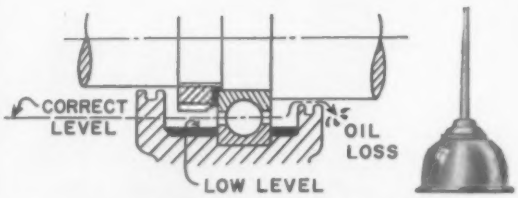
DISTRIBUTOR DAN, the SKF bearing man, tells

WHY BEARINGS BECOME OVERHEATED

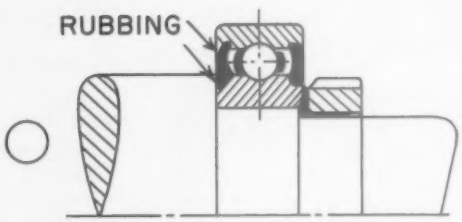
and how to correct the conditions that cause excessive heat.



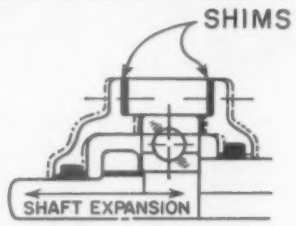
LOOK FOR THIS SYMPTOM. Discoloration of a bearing's rings, balls or rollers is a sure sign of overheating. The color is usually a gun-metal blue or bluish black.



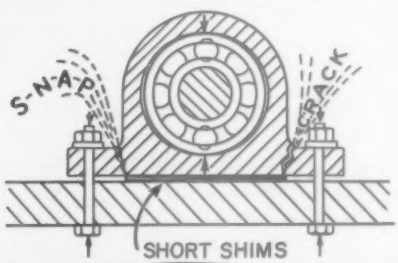
IMPROPER LUBRICATION OR LUBRICANT accounts for most cases of overheating. In pillow blocks, if oil is specified, fill only to the center of the lowest ball or roller in the bearing. If it's grease, the lower half of the pillow block should be filled. Therefore, be sure you're using the right lubricant—in the proper quantity.



RUBBING is a frequent culprit. Check the running clearance of the bearing seal. If it rubs against the shaft shoulder, re-machine the shoulder, to allow proper clearance. Bent lock-washer prongs are sometimes to blame. Straighten them or replace the washer.



EXTERNAL HEAT, conducted through the shaft, can make an inner ring expand excessively. It's usually the result of using a bearing with inadequate internal clearance. Make sure the replacement bearing is exactly the same as the original bearing. Should the markings be indistinct, consult an **Authorized SKF Distributor.**



THE BEARING HOUSING may be to blame—if it's warped or if the bore is distorted and out-of-round. Check to see whether the bore is pinching the bearing and relieve by scraping the bore. Make sure, too, that the pedestal surface is flat and that any shims cover the entire base area.

Baffled by a bearing problem? Whether it's selection, mounting, or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.

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Spend now for quicker profits

That's the old saw: "You've got to spend money to make money." And it has never been more true than it is today. Why? Because most plants are working uncomfortably close to their break-even points. On the average, industry is producing at only 82% of rated capacity. The hoped-for volumes forecast for 1960 aren't materializing. This chokes off profits fast. And blocks the easy route to cost cutting (increasing production rates) until our manufacturing economy picks up speed again. In FACTORY's opinion, profits can be improved now only by more courageous action.

When manufacturing plants feel the chill of shrinking profits, there are two basic ways to release the pressure. One way is to melt operating costs by the simple process of not spending money. This often sacrifices good judgment to penny-pinching expediency. It encourages deferred maintenance, slices engineering talent from sustained profit-improvement work, and stifles management initiative. This approach tends to be negative and short-sighted. Worse, it's not truly effective because it pares costs that are already close to the break-even bone rather than chop at costs that conceal deep layers of fat.

The second way for you to improve profits when the chill is on calls for more positive action. It means spending money right away for more productive tools to do your plant's non-productive jobs. These *indirect* jobs are the jobs whose costs aren't necessarily in direct ratio to production volumes. Prime examples include maintenance, material handling, and production control. These are the jobs that don't add value to your product. These are the "burden" jobs which push up your plant's break-even point.

You can spend money now on tools, machines and materials that enable fewer maintenance men to do more than your present crew can do. For instance: powered impact wrenches; powered pipe threaders; powered dump trucks; new materials for lubricating, insulating, and reinforcing.

You can spend money now on new equipment to reduce the cost of your material handling effort. For 24 quick ways to apply new methods and equipment in this vulnerable area, see what FACTORY editors found in Atlanta, pages 76-83.

You can go a long way now toward deflating white collar overhead by mechanizing your plant's production and inventory controls. This is especially rewarding since it trims direct—as well as indirect—costs. And your choices of equipment range from inexpensive punched cards to computers.

Obviously, it's wasteful to pass up any chance to save money, no matter how little. But there is a modern, faster way to increase profits when production volumes are low. Invest your company's capital wisely on high profit-return items aimed at indirect operating costs.

L. R. Bittel

EDITOR-IN-CHIEF

MATERIAL HANDLING IN ATLANTA CITY OF CONTRASTS

A study in depth. That is what you are about to read. In it you'll discover all there is to know about material handling in Atlanta, Ga., industrial center of the Southeast. Deftly blending old plants with ultra-new, this complex city mirrors the industrial United States.

To get the story you'll read in the next 22 pages, FACTORY editors interviewed key men in 80 plants. Then, directed by Production Editor Willis A. Bussard, they prepared this report—full of ideas and data for evaluating your plant's material handling practices and progress.

THE OLD: Like a page from *Tobacco Road*, this Atlanta plant holds out against the tide of progress.

THE NEW: Sharp, cement latticework; low, sleek silhouette are the marks of Atlanta manufacturing today.

Contrast Atlanta-style, is the catalyst of progress—the symbol of success for this Southeastern boom-town.

In almost everything that happens in the Gate City there is the pattern of contrast.

• Its big, well-managed long distance transportation system belies a seriously inadequate highway network.

• Though boosting the South's most mature approach to integration, it faces legislative war over this issue next fall.

• Proud of its many new well-managed manufacturing plants, it cannot hide the facades of those that smack of 19th century (see above) sweat shops.

But in Atlanta, business (manufacturing in particular) is king, and management an honored spokesman.

As Atlanta Mayor William B. Hartsfield puts it: "We roll out the red carpet, overwhelm businessmen with hospitality. We assure them of fair treatment . . . break

There's plenty of land in Atlanta for its exploding population and booming industry. The problem is not how much, but how to use it.

our necks to get industry in here . . . and do all we can to keep it."

And get the industry it does. Since 1946, over 2,000 new industries have begun operations within the greater metropolitan area.

Metropolitan Atlanta is 1,724 sq. miles, five counties, 46 cities and towns with a total population of over a million.

FACTORY asked Ralph McGill, Pulitzer prize winning publisher of the Atlanta *Constitution*, when the land would be exhausted.

"It'll be 50 years before we feel the least bit cramped," he answered.

How much is not the problem. How to use it is. Many of the plants FACTORY editors visited (some no more than three years old) were already bursting at the seams, in dire need of more space. Even the most optimistic company planners have underestimated the growth potential of Atlanta.

What's behind the rush to Atlanta?

According to the most recent survey of 20 metropolitan areas by the Bureau of Labor Statistics, a family of four in Atlanta requires a lower budget than in any of the other 19. This "cost of living" reference shows, for example, that of a total budget of $5,642, just $1,514 would go for food and beverages, including 212 meals out, alcoholic drinks and snacks.

But, typical of any booming city, living conditions are not so fine for certain elements of Atlanta's million-plus. Slums exist for fully one-quarter of the city's population. And unless society changes radically, say the experts, slums will always exist in one degree or another. Thanks to Federal aid, however, and Mayor Hartsfield's insistence that Atlanta be attractive to all, a $110-million city improvement program *is* under way. Five urban renewal projects are included in the city's ambitious plans.

What is Atlanta?

Since its phoenix-like rise from the ashes left by General Sherman, the city has been the transportation hub of the South.

Seven major rail routes, 13 main lines, and 64 passenger trains daily make it the largest rail center in the South.

Seventy regulated, fixed truck operations serve Atlanta manufacturers with daily schedules that include one-day service to points as far west as Memphis and New Orleans. There's two-day truck service to Chicago or Miami.

But perhaps more than any other means of moving men and material it is the airplane that has assured Atlanta its role as transportation headquarters for the South.

Atlanta ranks ninth nationally in passengers carried; fifth in departures; seventh in air mail and sixth in air cargo tonnage. None of the cities outranking Atlanta is in the South. (Miami receives more passengers for obvious reasons.)

Star performer in Atlanta's aviation show, and darling of local businessmen is Delta Airlines, now the nation's fifth largest carrier.

Headquartered in Atlanta, Delta is the area's seventh largest employer, with 2,900 on its local payrolls. The airline's new jet maintenance center (where it overhauls and checks its fleet of Douglas DC-8's and Convair 880's) is expected to expand its Atlanta payroll to more than $20-million annually.

Atlanta is a labor paradox.

Where national companies have imported organized labor, under contract agreements settled somewhere else, labor is in. Where management rules with traditional "Old South" control, labor is out. At present the union picture is almost *that* simple.

They're digging, digging, and digging some more to make room for Atlanta's choked auto traffic. Here a crew goes where a "Cat" can't, to widen N.E. Piedmont Rd., a key highway.

At Lockheed Aircraft, for example, or at any one of the automobile assembly plants, unions flourish as well as in any other city.

This comment from the manager of an old line shoe factory reflects the other extreme:

"I hate two things—integration and unions."

This man's plant is not organized.

Many things help to make Atlanta the management paradise it appears to be on the surface.

- The city government, led by Hartsfield wants it this way and makes sure it stays that way.
- The Georgia Department of Labor retains the confidence of organized labor, while at the same time doing a good job for management in placing the right personnel.
- Georgia has a strong right-to-work law.

What does labor think of this management paradise: To find out, FACTORY talked to William Montague, President, Georgia AFL-CIO and Charles Gilman, AFL-CIO organizer.

"Elected officials are definitely pro-management," said Montague, for 13 years a metal finisher at the local Chevrolet plant.

"And the right-to-work law has hurt us too . . . The climate for the unions is not good.

"But the picture's changing. In the next ten years it'll be our turn," he says with confidence.

Organizer Gilman isn't waiting that long.

In a few months he plans to assault unorganized plants with a labor "task force" that pools the men and financial resources of several locals with the idea of getting just one into the unorganized plant. Once one is in, so the strategy goes, the rest eventually follow.

Gilman figures his chances are better than in Philadelphia, where the new method was first tried. (Pointing to determined local opposition and the organizing troubles unions are having even in the North, FACTORY sources don't agree with Gilman's optimism.)

According to Gilman, about 80,000 workers in the Atlanta area belong to a union. There are over 400,000 in the labor force.

Turn the page

Concerned that prolonged closing of schools may cause severe economic trouble, Atlanta will "stay open whether the state does or not."

Of the total labor force, (nonagricultural) occupational percentages look like this: professional, technical, 12%; management men, 10%; clerical and related workers, 14%; sales, 8%; skilled workers, 16%; semiskilled, 22%; service workers, 10%; and laborers, 8%.

Hourly wages (according to a BLS survey of 20 major cities) stand at these levels, as of spring, 1960: material handling laborers, $1.53 (third lowest of the group); fork-lift operators, $2.00 (fourth lowest of the group); Overall average hourly earnings last year were among the lowest in the survey.

No report on this one-time stronghold of the Confederacy would be complete without a look at the segregation issue.

Atlanta's approach to the situation is perhaps the most mature in the South. Because of its rapidly growing industrial facilities and a city government that prides itself in providing "equal" opportunity for all, Atlanta is hardly a racial powder-keg.

It is no secret, however, that when the 1961 academic year arrives for Atlanta's public schools, there will be governmental war.

The state, it is known, intends to close *all* public schools if the Federal courts enforce a school integration order for that date.

The city has other ideas.

Says Mayor Hartsfield: "We will do all we can to keep our schools open . . . injunction, or any other legal means . . . *we'll* stay open, whether the state does or not."

Last spring another Atlanta group, the PTA of DeKalb county, voted to take whatever action *it* can to keep the schools open.

Why this empassioned concern for schools being open or closed? Because industry wants nothing to do with a racially unstable area or one without schools for its employees' children.

"If the schools close for any length of time, it may cause severe economic trouble," say Atlanta's leading citizens.

Indeed, all is not goodness and light in this city of contrasts.

Under Georgia's unique and highly controversial county-unit system of government, one rural vote can nullify up to 150 votes from the heavily populated Atlanta area. With taxes, too, populace Atlanta gives the most, receives the least.

Result: Atlanta is short of public money with which to effect needed improvements. According to Mayor Hartsfield, a sales tax is under consideration as a remedy.

Up until a few years ago, Atlanteans confess their city just grew with the wind. Peachtree Street, for example, just followed the impractical, curving contour of Hog Mountain. Zoning policies were confused and conflicting.

True, special effort is being made today to plan more effectively. But even now private, commercial and public building projects are moving along so quickly that planners may never catch up. In 1960 there were 13 new manufacturing plants started, in addition to 10 new office buildings, nine warehouses, and 11 other new structures like the $15-million

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Aviation is a vital part of Atlanta's success story. When this $15-million air terminal is complete, it will be the most modern jet facility serving the South.

Atlanta Municipal Airport (see photo above).

Atlanta's mushrooming population does and will continue to strain the city's service facilities. Real progress is being made, however, to combat some of these shortages.

Police are honest and effective (the city prides itself on its "no underworld" reputation). Water reserves are among the finest in the country. Other problems such as electric power, sewage and sanitation are being worked out through unusual city-county cooperation.

The biggest problem harassing city fathers is Atlanta's highway and road traffic. With each new family come one or two automobiles. Truck traffic is immense. The hitch: Atlanta's roads were planned for horses and Model "As," not high-speed, high density motor traffic.

What's being done now: A system of expressways is under construction. They run north, south, east, and west, and will connect like spokes of a wheel with a city-circling circumferential expressway. Soon, a driver will be able to circle from one side of the city to the other and never hit temper-trying, time-consuming city traffic.

And for the future: A bold plan from the Atlanta Transit System to provide rapid rail transit that will bring 320 riders in from the suburbs every five minutes during rush hours; move them from train to street by "carveyor" and moving sidewalk. There will be no waiting, large parking lots at outlying stations. And the whole system reportedly will move faster and more cheaply than present auto runs on the expressways. Still needed to get it started: A $59-million appropriation from the state.

They're on the move in Atlanta. And the people love it. Few cities can match the civic pride contained in an Atlanta handshake.

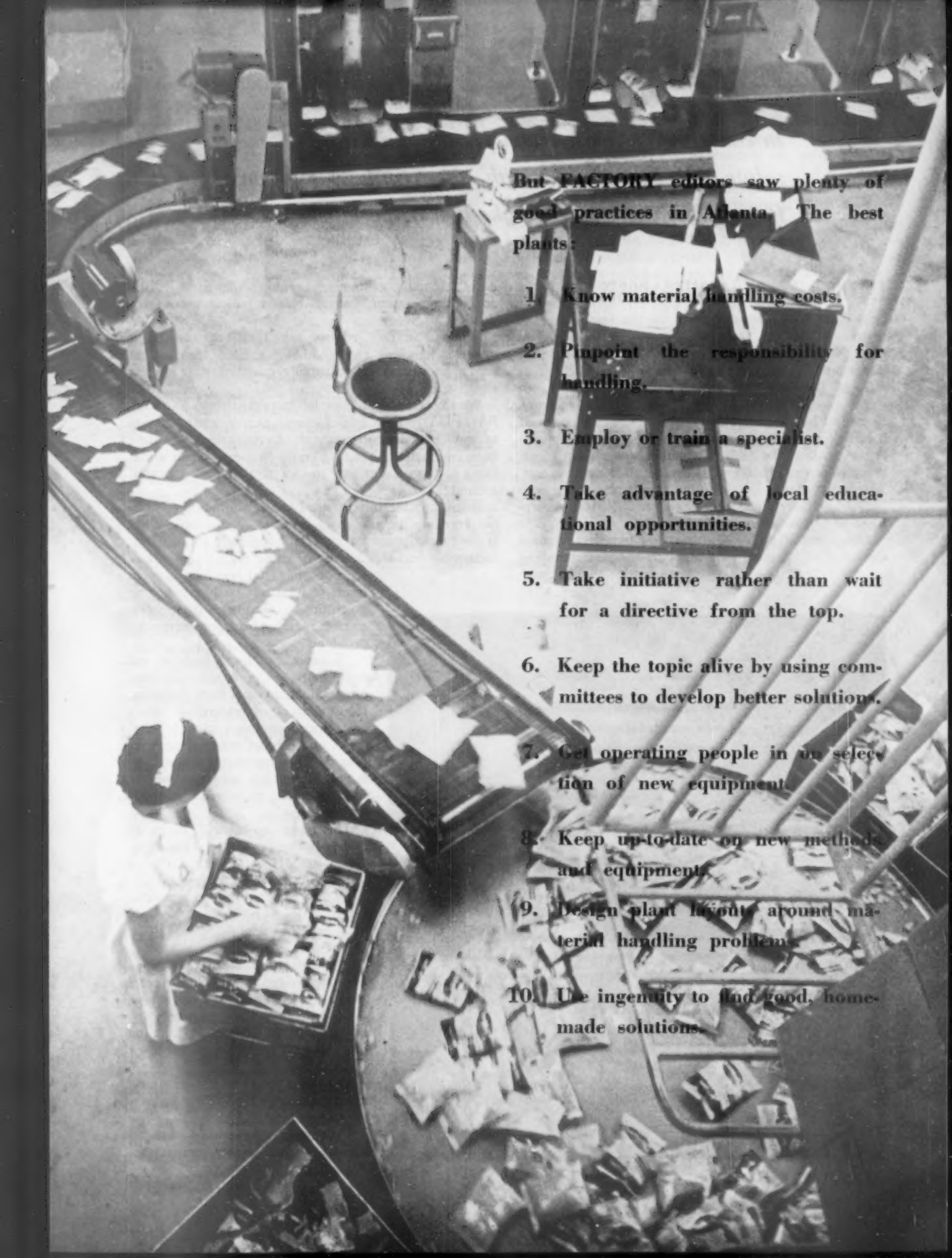
What is Atlanta?

Mayor Bill Hartsfield claims his city has Yankee arms and legs and a Southern heart. However *you* say it, one thing is certain—Atlanta is a good town for business.—**L. F. Mihlon**

FACTORY'S SURVEY OF MATERIAL HANDLING IN ATLANTA REVEALS A MASSIVE NEED FOR BETTER PRACTICES

In Atlanta, FACTORY editors saw these local symptoms of national apathy.

- Company presidents and managers agree (72%) that material handling is "extremely important." But in too many cases this is lip service.
- Rare are the plants that accurately know their handling costs. Few have pinpointed responsibility.
- Few plants have developed a material handling specialist or encouraged outside stimulation. Few have taken advantage of Georgia Tech's excellent, local M.H. course.
- Half the plants have never altered poor handling designs. Two-thirds don't measure efficiency of their handlers, or know what return on investment new equipment merits.



But FACTORY editors saw plenty of good practices in Atlanta. The best plants:

1. Know material handling costs.
2. Pinpoint the responsibility for handling.
3. Employ or train a specialist.
4. Take advantage of local educational opportunities.
5. Take initiative rather than wait for a directive from the top.
6. Keep the topic alive by using committees to develop better solutions.
7. Get operating people in on selection of new equipment.
8. Keep up-to-date on new methods and equipment.
9. Design plant layouts around material handling problems.
10. Use ingenuity to find good, homemade solutions.

In conversation, most managers are quick to salute MH. Few show it with cost records. A solution: Put one man in charge, make him a specialist.

1. KNOW YOUR HANDLING COSTS

Few plant managers disagreed on the importance of material handling. Only 9% of those interviewed in Atlanta regarded it as "minor"; 72% called it "very important." But few really knew how much their material handling was costing them.

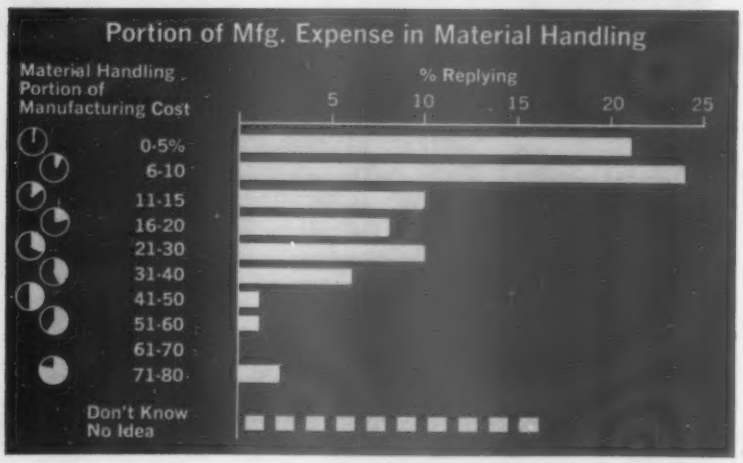
An exception was Crown Cork & Seal Company. In their 7-acre single-story new plant the cost of handling material averages 15 to 20% of total manufacturing cost. In each production department, costs are kept separate and can be picked off the cost report. The work of the 35 full-time handlers is measured against predetermined time standards. This measurement of performance controls costs.

But as the chart below shows, few plants other than Crown Cork & Seal can pinpoint material handling costs. Usually costs are buried somewhere in the accounting system, unavailable as indicators of production efficiency.

When FACTORY editors asked: "What are your material handling costs?", 16% had no idea. Plant men who gave a figure usually qualified it as only a rough estimate.

We expected this. (See Bridgeport survey, FACTORY July 1955.) Few manufacturers know what it costs to handle production material. As one said: "We don't have any material handling costs. Whoever needs something just goes and gets it—we sort of pass the stuff around."

Admitting the importance of material handling—but not knowing its true cost—indicates confusion. What is the proper place for material handling? Most manufacturers—and this is true of those outside Atlanta—see poor material handling only in terms of final results: high machine downtime, customer disappointments, truck hold-ups, or demurrage problems.



However, a closer look at the basic cause of poor material handling might prevent these troubles. Keeping track of material handling costs forewarns alert management.

As one cabinet manufacturer reported: "Though material handling is very important, we know we are just scratching the surface of what we could do."

This plant pro rates 20 of its 95 hourly workers to material handling. Over-all, MH represents 60% of total manufacturing expense.

Others who recognized and controlled MH costs were:

- A bottling plant—"MH is 80% of our cost."
- A brewery—"We have $\frac{1}{2}$-million invested in MH equipment."
- A printing plant—"We charge 6.1% handling charge to each job."
- An aircraft plant—"Handling costs are 40 to 50% of our labor costs.

But these plants were a minority. Most paid only lip service to controlling costs.

FACTORY's conclusion: Material handling needs greater recognition.

2. PINPOINT RESPONSIBILITY

Unless someone is directly responsible there is little material handling improvement. It's too easy to avoid taking action.

As a textile machinery manufacturer admitted: "Our antiquated methods cost us money—and we know it." But no one in the plant was responsible. It was just a part of everyone's job.

Not so at Reynolds Aluminum Supply Company, where Seymour Anderson is manager of warehouse practices. "Andy" is charged with reviewing material handling practices in all 13 plants. Right now he is closely watching a test of a Brenaman rotary plywood unloader which is saving $12 on each car of plywood.

In many plants responsibility for suggesting, developing, and approving handling improvements (see chart below) ranges from the department foreman to the purchasing agent. Only three plants had someone with material handling in their title; 90% did not even have a committee for improving handling practices.

In most plants responsibility floated, never settled down. Now there's nothing wrong with defining MH as part of everyone's job. But if no one is charged with coordinating all improvements, they get lost among other daily routines and responsibilities. It's unrealistic to expect a busy production manager, for example, to keep abreast of the fast-moving handling field.

Failure to pinpoint responsibility in Atlanta might be blamed on its tremendous growth: Expanding companies have little time to refine operations. But this is not the case. Old-time plants as well as new ones fail to define responsibility for MH.

As the table shows, top management retains final responsibility for MH expenditures. But it has failed to pass down a definite responsibility for suggesting and improving. This has been diluted at lower line and staff levels.

In Atlanta only 15% of the plants we saw had a MH specialist of any sort. Only 8% used a MH committee. Four plants admitted no one was responsible.

FACTORY's comments: We wonder how many good ideas for improving material handling die because no one of stature is available to push them. Not many boasted—as did the auto plant which had pinpointed responsibility: "Lately our biggest savings have been in material handling, not in production improvements."

And at another of Atlanta's auto plants (Chevrolet's) there was a good blend of line and staff responsibility. Improvements can be suggested by anyone, but responsibility for their development rests with line supervision aided by the special materials engineer. Final approval is by the department heads.

3. EMPLOY OR TRAIN A SPECIALIST

Yet few Atlanta plants (11 out of 80) had such an individual. Four substituted outside consultants, three used a staff man from central headquarters. The other four plants depended almost entirely on an in-plant industrial engineer.

Even though half the plants in Atlanta were part of a national organization, few had access to such a specialist. Those who did found that dependence on far away help did not insure needed improvements. Local responsibility was still important.

Some plants called in suppliers for help. And these equipment specialists did help where selection of equipment solved the MH problem. But they were no help in supplying the benefits of an in-plant specialist: application of work standards to improve costs and performance, improved production and delivery schedules, and reduced demurrage.

The absence of MH specialists in Atlanta plants could have accounted for these statistics:

- 30% had made no improvements the past year.
- 42% were planning no improvements during the next six months.
- 50% could see no use for 13 types of recently developed MH equipment.
- 55% left MH responsibility to each department with no coordinator.
- 50% had never modified buildings that admittedly created handling problems.

RESPONSIBILITY FOR MATERIAL HANDLING IMPROVEMENTS

		No. of Mentions for:		
		SUGGESTING	DEVELOPING	APPROVING
	Top Management (Pres., V. P., Div. Mgr., Gen. Mgr., Dir. Mfg.)	8	13	52
LINE	Plant Manager	6	9	16
LINE	Plant Supt.	20	16	14
LINE	Dept. Head	17	8	4
LINE	Foreman	22	6	1
LINE	Suggestion Plan	27	2	0
STAFF	Industrial Engineer	11	18	2
STAFF	Plant Engineer	5	19	1
STAFF	Methods Dept.	0	5	0
STAFF	Purch. Agent	1	2	0
STAFF	Suppliers	1	6	0
STAFF	Consultant	3	2	0
STAFF	Others (Traffic, Warehouse, Material Managers; Cost Acct.)	3	3	0

Better material handling is a challenge to many managers. Few meet it. One solution: Take advantage of local people and their abilities.

4. INVESTIGATE LOCAL EDUCATION

Opportunities are often available. Yet few take advantage of them. Despite the fact that Atlanta's own Georgia Tech sponsors one of the few college courses in material handling, only 8% of the plants had ever enrolled anyone in it. Many had never heard of it.

As the chart (right, top) shows, a majority of the plants felt little impact from outside activities.

Though Atlanta boasts a Material Handling Society chapter, it affected only six of the plants surveyed, less than 8%. Many of these felt benefits were marginal. As expressed by a brewery production manager: "Our plant manager is an AMHS member but finds nothing of real value at the Atlanta meetings."

This attack on local activities in the material handling field might be self-indicting. Most men we talked to felt there was not enough time to take part in outside activities, while others, like the sophisticated material handling group at an auto assembly plant (representing 10% of the payroll) felt they already knew the answers. They could receive little from attendance at meetings.

But others, like H. W. Lay & Company, keep learning (page 77). Even big Lockheed Aircraft has sent 10 men to the short MH course led each year by Paul Eaton at Georgia Tech. (Georgia Tech also has the only active student chapter of AMHS in the nation.)

Several plants consulted with Georgia Tech in the design of new production lines. Others credited industrial engineering training at Georgia Tech for generating ideas. A textile machinery general manager reported: "It made our assistant plant manager much more material handling conscious. We realized we were not handling stuff in big enough quantities, not planning our moves wisely, nor using space carefully. And we discovered we were using three- to four-dollar men to do MH work."

Plant visits are good sources for ideas. A steel company discovered straddle trucks during one such visit to another Atlanta plant. Others "make as many plant visits as possible . . . never fail to pick up a good idea."

Industrial shows, like the November MHI show in Louisville, offer ideas. One vice president even reported he saw a new conveyor idea at a tool and die show. It's now used in his plant.

FACTORY's recommendation: Take advantage of local opportunities that exist. For example: If a paper products plant in Atlanta visited another just a few miles away, they could no longer say: "We can't justify using mechanical equipment to replace the five men hand-stacking finished goods." At that plant they would see a live storage roller and powered conveyor system which paid for itself in two years and did the same job, better.

5. TAKE ACTION YOURSELF

Many plant men rely on new ideas coming from the top. If you really want to improve things, why not do it yourself?

Some plants have top managers (specialists in material handling improvements) who can devise ingenious improvements themselves. This was true at Moncreif Furnace where Vice President Foster Law is a professional engineer. (See page 78.)

But waiting for material handling directives from the top, especially in large companies may mean a long wait.

Electric Autolite didn't wait. It undertook its own study of material handling—and developed a model solution for the company's other battery plants. The project showed standardization on a 4000-lb. unit load limit and a few new types of interchangeable stacking bins and shelves could double shipping and in-process storage capacity, eliminate night shift shipping, and cut out product damage. "We relied heavily on headquarters specialists as consultants, but we figured the problem was ours to solve," said Bill Curto, plant manager.

In half the plants in Atlanta the opposite approach was typical: "We expect the solution to come from New York—from Detroit" or wherever the company headquarters were located.

In dealing with headquarters some give up in frustration. As one plant man commented: "Our dealings with headquarters involved a certain lift truck. To get it we had to correspond with New York until the paperwork and the truck weighed the same. When headquarters finally did authorize it, the truck cost $3,000. The paperwork, wasted time, and other foolishness cost ten times that."

Even if final approval must come from the top, necessary details can originate with those closest to material handling. Most top management men agreed they are looking for profitable ways to invest money. If new material handling equipment or methods will give the best return, they reported, that's where the money will be invested.

6. USE THE COMMITTEE APPROACH

Especially when it brings a fresh viewpoint that can spot critical material handling problems.

As one manager reported: "Often production people don't even know they have a problem—though moving material is our biggest task here."

The solution here came by tackling such problems informally in a committee made up of the production manager, plant engineer, and a staff man.

A more formal setup is used by an auto assembly plant which has a MH department of 230 men in a 2800 man plant. Here material handling is such an integral part of the plant's operation that it requires a formal approach.

The talent FACTORY found on MH committees ranged from maintenance superintendents to tool design engineers. In several plants material handling was a responsibility assigned to an existing committee —a board of control, a superintendents meeting, or a seven-man mechanization committee. At Lockheed, a formal MH committee which meets monthly, inspects problem areas, and makes profitable recommendations.

According to the FACTORY survey, 71 plants in Atlanta have no kind of material handling committee —nor is the responsibility placed with a specialist. In such cases responsibility falls to top brass by default. Often it's lost among the shuffle of more easily discerned problems.

One aid we found to concentrating attention on material handling: Keep everyone aware of the cost. One meat packing house uses the simple rule: "Eliminate one man and we can spend $12,000 on new material handling equipment."

7. LET OPERATING PEOPLE HELP

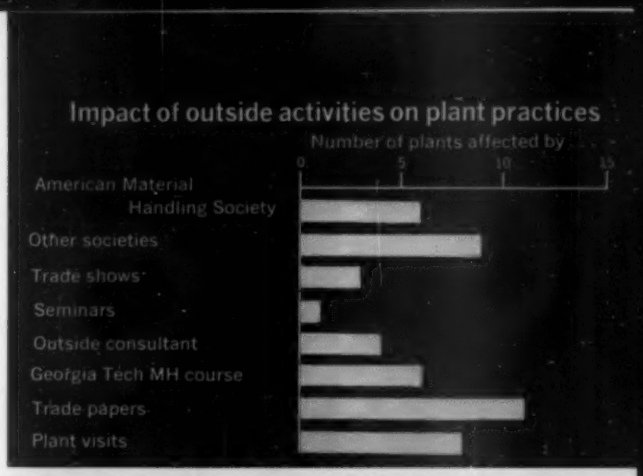
In most cases (see chart right, bottom) selection of MH equipment was left to staff people or top management. In less than 25% of the cases did production people share responsibility for selection.

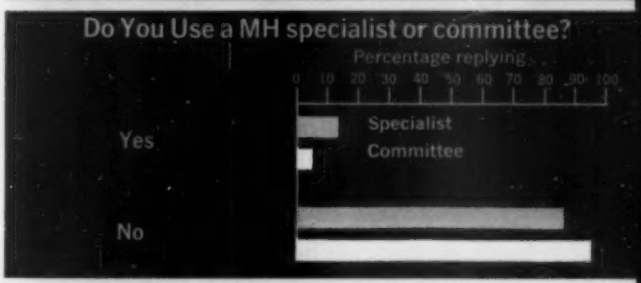
The use of staff people in selecting equipment is natural. Reason: Industrial and plant engineers, maintenance superintendents, and purchasing agents are equipment or supplier oriented.

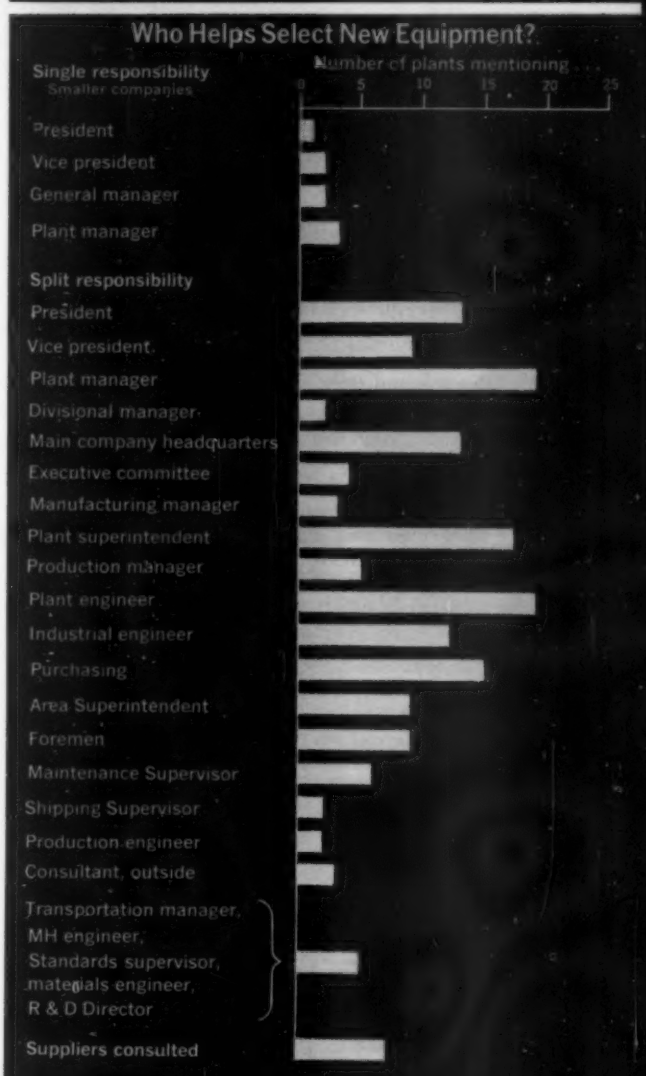
As part of the selection process more operating people should be consulted, said the Atlanta group. They can prevent seemingly small but important personnel problems caused by the wrong type equipment. They are the ones who must sell the use of the equipment within the plant.

In only a few companies—primarily small ones—did FACTORY's editors find one person solely responsible for selecting new equipment. It was a group effort. The larger the plant, the higher the final decision. Few plants entrusted anyone below a general manager or vice president with approval on a piece of equipment worth more than a few hundred dollars.

FACTORY's observation: Don't overlook the contribution operating people can make in selecting new material handling equipment. Letting them in on the final selection is the first step toward generating enthusiasm for better material handling methods.







Few managers know whether to get better equipment or change layout. One answer: know what is going on outside your own plant.

8. KEEP UP TO DATE

The surprising aspect of the Atlanta survey was the lack of new ideas in many plants. In a booming city with new plants, and others expanding, we expected to find new equipment and new material handling methods commonly used. They weren't.

Almost half the plants had made no improvements in 12 months (see chart at right, top) nor planned any for the next six.

In plants dating from the last century, FACTORY's editors expected this attitude: "If successful for so long, why change our methods now?" But it was surprising to find so many recently established plants sharing the same feeling.

As the chart (see right, center) shows, few plants are yet using equipment which has been on the market for years. Returnable shipping containers was an exception—although they are hardly "new." Out of 31 possible plants 28 are using them in Atlanta.

Though 20 plants had adopted palletless handling, 22 more could have been using it profitably. The proportion was even greater on reach-fork trucks, automatic palletizers, dispatching conveyors, and paper pallets.

When we questioned men responsible in their plants for material handling, their lack of knowledge about new material handling methods was startling. Eleven confessed they had never heard of palletless handling. Operatorless tractors were unknown to seven, automatic palletizers to six. And side-loading trucks were strange news to seven managers.

Older, traditional material handling equipment was known and used by most plants. As the chart (right, top) shows, Atlanta plants have been buying fork trucks, dollies, conveyors, cranes and hoists.

But there were some examples of the latest equipment. Atlanta is a progressive city. Some of its plants *are* using new types of material handling equipment. Magnetic conveyors for cans and nails, adjustable dock plates, electric-eye sorters, collapsible carriers for wire roll, straddle trucks, automatic dispatching conveyors—all were operating in more than one plant.

Sonoco Products represents one reason for the use of newer material handling methods: the absorption of local firms by national companies. Transfusion of new blood does affect material handling.

Charles Suggs, plant manager for the 118-man Sonoco plant (making paper tubes) brought new ideas with him when he took over the Atlanta paper mill several years ago. Since that time his plant has started using fork trucks, simplifying material flow, adding needed shipping and receiving facilities, and moving rail spurs to unload three cars at once. But they aren't stopping there. Suggs has other improvements in mind on loading of trucks and handling material.

Other plants have developed or adopted improved techniques. A brewery now bulk handles 75 cartons at one time. A brick company lifts a full truckload of brick in one motion. A boat company uses an adapted elbo-lift truck for handling its finished product.

One of the most sophisticated systems—an electro-mechanical autobody sorter—is at the Chevrolet plant in Atlanta. Mead Packaging Division has developed a waste baling system that automatically disposes of scrap paper. And a metal company plans to use closed-circuit TV with its skip hoist.

Adopting new equipment and methods does pay. A meat packing house uses a hoist to chemically clean meat molds, eliminating onerous manual cleaning and cutting the time from eight hours to one-half hour. A shoe machine manufacturer increased oven capacity 300% with a new rack. A brewery went from 75 cases to 300 in a fork truck load with special prongs. And a pottery plant unloads a car of clay in 1½ hours with a mobile shovel. By wheelbarrow and manual shovelling it took four man-days.

Six new plants in Atlanta adopted the latest equipment while the plant was being designed. Seven more are eagerly looking forward to new plants, that leave obsolete methods and equipment behind.

But even a new plant doesn't assure the best material handling. One in operation less than nine months already finds storage area inadequate. Another has already modified its $75,000 conveyor system.

How do you stay up to date in material handling: Observations away from the plant generate many ideas. Plant visits, industrial shows, professional meetings, seminars, trade papers—all offer good hunting for profitable ideas. But only if there is a conscious effort to keep up to date.

9. ADJUST BUILDINGS TO MH PROBLEMS

For those who don't, it soon requires more labor to move the material than produce it—a poor basis for company success.

Many plants in Atlanta suffer from material handling restrictions built into the structure. Characteristic is a packaging machinery producer who has: "Too little floor space, bad layout, not designed for this operation, not enough open space."

His complaints were echoed by others—not un-

expected in a city where 25% of the plants are over 30 years old. Some date back to the 1800's, one as far as 1820. Descriptive of the oldest MH problem was: "When General Sherman stabled his horses on the floor in this plant, the load deflected the beam dangerously. A hundred years later the same deflection limits floor loads in this building." As a result fork lift trucks can't be used.

The obvious absence of cranes in some plants can also be traced to age. Reason: The walls or foundations are not strong enough to support them.

As the chart (right, bottom) shows, low ceilings and dissimilar buildings were the biggest structural obstacles to good material handling. As a result storage space encroaches on production space. Unnecessary effort is consumed transporting material between oddly arranged buildings.

Expansion has added further complications. When "temporary" buildings are at some distance from the main plant, more time is spent hauling material over the city streets than within the plant walls.

Another common complaint was about the number of floors. Only processing plants could take advantage of the older four or five story buildings. But as a candy manufacturer said it: "Material flow is poor because our building was purchased, not built. The multilevels require long conveyor belts that constantly need adjustment."

Those who move to one or two story plants expressly built for their production requirements are happy. A toy manufacturer recalled: "When we moved from a five story to here we cut material handling costs 50% in the move. And we laid off 20 material handlers."

To get relief from building restrictions, many plants have built new additions that incorporate some of the desired improvements. The most frequent one has been new shipping and receiving platforms. (Two plants thought they were the only one in the city with loading platforms on three separate levels.)

Other plants tackled the building problem head-on by widening doors, raising roofs, re-laying floors, and knocking out walls. In each case the goal was simpler material handling.

The most wanted, but most difficult, alteration was higher roofs. Height to truss was 12 to 14 feet for almost 40% of the plants. Another 30% were putting up with 15-ft. truss heights.

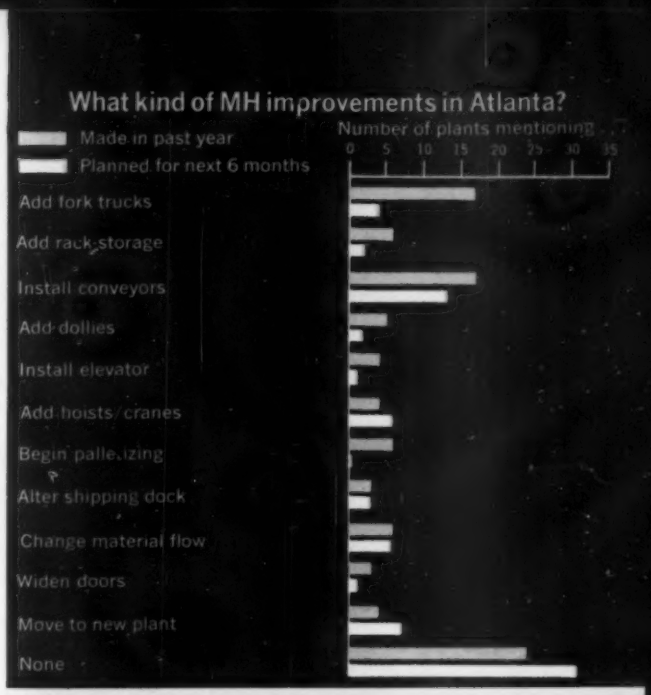
A couple more feet in vertical storage often increased cubic capacity by 25%. Ford's new addition of two more feet permitted four instead of three racks, five instead of four engines.

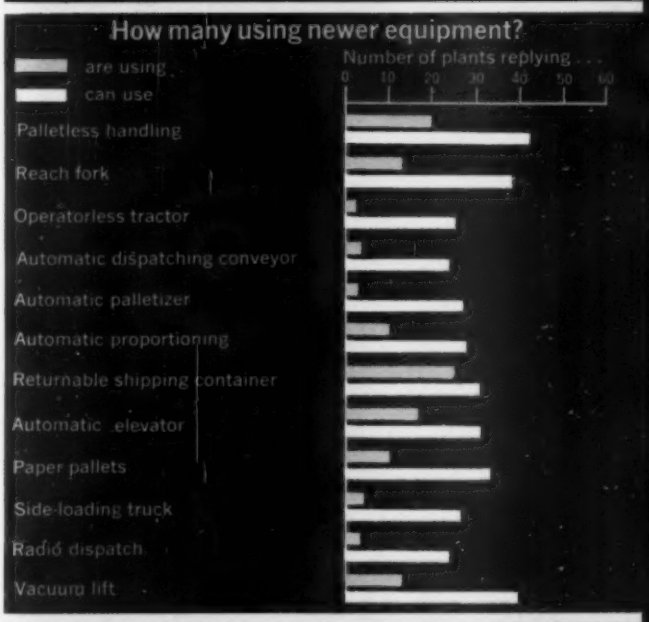
Column spacing was a less critical problem than ceiling height, although the survey indicated newer plants were going to larger bays.

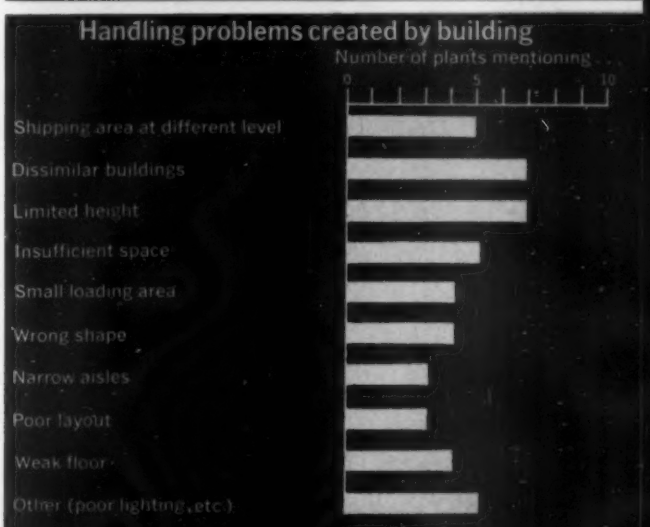
FACTORY's conclusion: A good plant structure is based on material handling.

10. EASIEST SOLUTION: INGENUITY

Not a plant in Atlanta was without handling problems. They existed everywhere. **But the most heartening aspect of the survey was the "I can solve it" spirit, demonstrated on the next pages.**







IMAGINATION IN ATLANTA SOLVES MATERIAL HANDLING PROBLEMS

FACTORY's exploration of 80 plants turned up dozens of ingenious handling practices. Home-made solutions were common. Few improvements waited for the equipment salesman to break down the door. In each case reported on the following pages, the operating manager had a problem—and solved it. The lesson: There's no substitute for imagination—and management alertness—in solving material handling problems.

You're sure to find useful ideas in these 24 cases.

Old way: Shaky, space-wasting. New way: Solid, space-saving.

Always seeking improved methods, H. W. Lay & Company (potato chips and food snacks) was happy to adopt a suggestion by a recent plant visitor. The result: greater and safer in-plant storage space.

In its Chamblee, Ga., warehouse the conventional way of storing burlap bags of shelled peanuts was on pallets (above, left). The 120-lb. bags were stacked in tiers of two, flat sides down, four bags per pallet. Pallets could be stacked two high, but not three high (because they occasionally fell). The bags didn't lock firmly even though second-tier bags were criss-cross to the first tier.

A plant visitor suggested to the warehouse foreman: "Stack the bags on edge; the ears will lock the four bags together firmly."

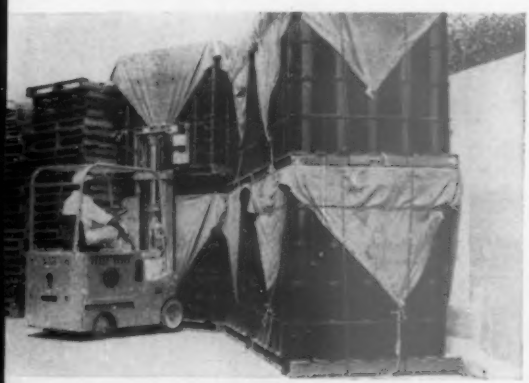
Lay tried it (above, right). Now pallets can be stacked more than two high, making the most of warehouse cubage —with no more fallen piles.

. . . MATERIAL HANDLING IN ATLANTA

Many directions are possible in solving material handling problems. In Atlanta plants they profitably palletize, mechanize, conveyorize.

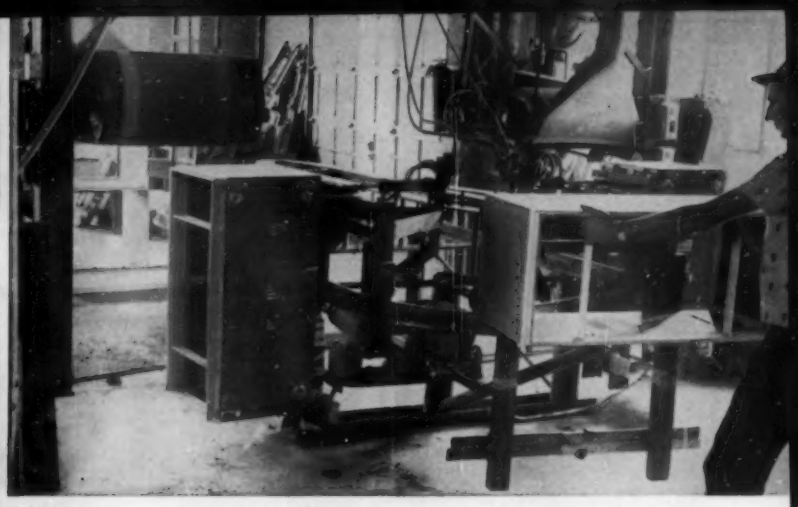
At Pittsburgh Plate Glass paint division (below, left) it used to take 16 manhours to load or unload a car of 3600 pails. Demurrage on the boxcars used to total $175 per month. Now the time for unloading or loading is one hour. Demurrage charges have been completely eliminated. The solution: palletizing. Pails are piled on a pallet, 150 at a time, and held in place by tarps tied to the pallets. The new system has reduced pail inventory 50%. Combination of less inventory and outside storage has freed 1,000 sq. ft. of indoor storage space.

Moncreif Furnace (below right) found mechanization the answer to handling hot air ducts. Before mechanizing, duct was produced at a series of stations from flat sheets that came in on 4000-lb. pallet loads. Now the starting point is a 7000 lb. coil—an initial material cost saving as well as an easier handling operation. Vice President Foster Snell designed the system himself. He used standard components: chain conveyors, electric eyes, and pneumatic rams. According to Moncreif this new line saves 25% in the cost of handling the materials.



Norris Candy Company, (below, left and middle) occupies an 8-story building in the heart of Atlanta. They make many types of candy, the boxes to pack it, and even print their own labels. The 8-story building is laid out so that as these products are manufactured, they will proceed down to the next floor. The trick was to get products down in one floor stages without tying up the inside elevator which was busy moving the raw materials up. So in the courtyard behind the plant, Norris constructed an enclosed spiral conveyor. It clings to one side of the building with two inside openings at each floor —one for delivery, one for dispatching material to the floor below. This vertical conveyor functions as a live storage area as well as a buffer for surges.

At the Warren Company, (below, right) a different type conveyor is paying off, both for Warren and a lumber mill ⅜ mile away. They have made an even swap: chip disposal for steam. Needing steam in manufacturing refrigeration equipment, Warren had a boiler house with three modest boilers. A logical fuel was the unwanted wood chips at the mill. Question: how to transport them? The answer: a 2-ft. diameter iron pipe across the valley between the two plants, passing at one point over a right-of-way of the Georgia Thruway. Motive power is a 50 h.p. blower. Warren takes all the chips from the mill and burns them promptly. When steam is needed, it costs nothing. Their only obligation to the mill: keep it clean of unwanted wood chips.



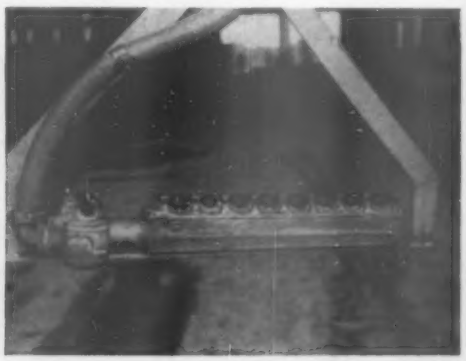
Mechanizing solved a material handling problem at Pasley Plastics, maker of soft vinyl dolls **(above, left).** Hand painting 4800 dolls in one day required two, eight-hour shifts and much slow movement of in-process material. Doll heads were in and out of boxes several times; workers handed the boxes from one work station on to the next, disrupting their productive work. The first improvement was a switch to spray painting. Accompanying it was development of the 3-ft. lazy susan shown above left. This merry-go-round of doll heads moves past 12 work stations at a speed of 2 in./sec. Each worker sprays on either lips, hair, eyes, etc. The head goes back on one of the 360 pegs and on to the next operation. The twelfth worker paints in the eye dots and packs the heads. The merry-go-round requires half the former space, serves half the number of workers. A complete shift was cut out on this one operation. **In making wood cabinets at Nunn-Better Cabinet Co. (above, right)** mechanization again simplified operations. Once the gluing and framing steps were completed in this small shop, all cabinet sides had to be sanded. The former method was to pass each cabinet (TV, phonograph, hi-fi) manually from one belt sander to another. Owner-proprietor Barney Nunn was able to cut labor costs as well as improve quality. He designed a ten-foot diameter turntable which transports the cabinets. As a cabinet reaches the succeeding sander, a new face is presented for sanding. One man loads and unloads the cabinets.

At Lovable Brassiere's new Atlanta plant (above, left and center) improved material handling was the goal even though intermediate material and final products were very lightweight. Taking advantage of many different designs, they now move all material by conveyors, both up, down and across their two-story plant. At some distance from the assembly area is the cutting room where parts originate. A 320-ft. double conveyor carries all sewn parts in tote baskets over to the assembly room. Parts come over by power belt conveyor, empty tote boxes return by gravity roller conveyor, left. The tunnel covering these conveyors serves also as a handy bad-weather passageway for personnel between the two buildings. Overhead conveyors carry three tiered racks, full of ready-to-package brassieres, to the packing area (center photo). In the basement, order-picking and shipping areas have their own roller conveyors. The final packages complete their plant tour on conveyors to the waiting trucks. "Any time conveyors can replace hand movement, we can save money" is Lovable's slogan. **At Owens Illinois Glass Company, (above, right)** conveyors also eased a handling problem. To gain floor space for material handling and storage, spiral storage conveyors were laid out at the end of each bottle-machine line. Three turns high, the 10-ft. diameter roller-skate conveyor is fed from a 30-degree incline elevator conveyor. The compact system saves several thousand feet of floor space.

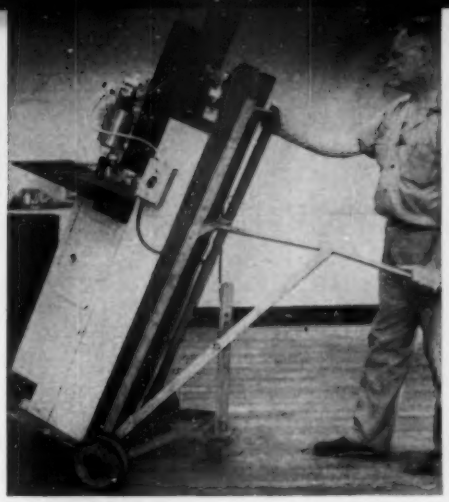
. . . MATERIAL HANDLING IN ATLANTA

Sometimes custom-made solutions may be the only answer for special problems. And they are not necessarily the most expensive.

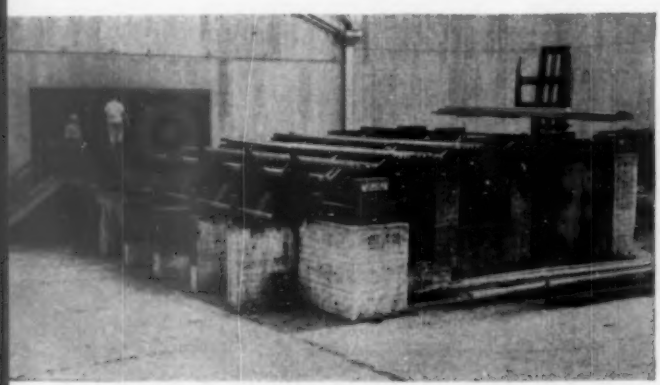
At Moncreif Furnace the 12-ft. lazy susan (below, left) was the brainchild of Vice President Foster Law, a professional engineer. He needed something which could both store and transport three different duct elbows between work stations. He designed and built his own conveyor from spare parts. The base: a gasoline station sign. The drive: an old Chrysler fluid drive. The power: transmitted from the electric motor to the underside of the revolving susan by a wheel from his boy's old wagon. Material cost $70; labor was $30. Purchase cost of one already made would have amounted to near $400. **Armco Drainage and Metal Products had a problem with their pendant controls (below, right).** Normally the pendants for its two floor-operated cranes were used in the vertical position. But continual lifting of the pendant by the operator broke the insulation on the wires. Downtime was excessive. So Armco devised a cradle which supports the pendant in a horizontal position. It eliminates constant bending of the wire, and makes operation easier for the operator, who frequently can operate it with one hand.



Equipping a 4-wheeled truck with an integral scale platform (below, left and center) is one way Eastman Kodak's Atlanta processing lab speeds color films back to the customer. One of the crucial planning steps in scheduling a daily run of film is to obtain, as soon as possible, net weight of film received from the post office in individual mail sacks. Previously Kodak had to wait till each package of film was opened and tagged, the rolls of film weighed and the total reported. The new method, using the truck and scales, weighs the sacks in groups as soon as they are dumped from the mail truck. An experience factor tells how much to compensate for gross weight. The tremendous speed-up in getting this key data to scheduling has quickly paid for the special truck. Its inner platform is suspended just above the original floor of the truck. A spring scale at each corner stake is the suspension system. Adding readings from the four scales gives gross weight of each newly received batch of film. **At Owens Illinois Glass Company's plant (below, right)** special handling problems required a special solution. Having adopted unit-load handling, without pallets, accurate stacking of cartons was critical. The solution: a portable corner for stacking cartons going to the warehouse. Mounted on brake-set casters, the sheet metal corner is shoved up against the empty train dolly. A wooden jig helps pile the first row of cartons, leaving room for the fork prongs. Other rows stack against the corner.



Auto-Nailer, manufacturer of shoe repair machinery, has developed special dollies, unavailable on the market. One of the main reasons for concentrating on dollies was safety. They wanted to keep to a safe load what one man would handle. **The V-type dolly (above, left)** is designed to carry a safe load of pipe and rod throughout the plant. Because of its shape it is difficult to overload. It also prevents material rolling off in transit to shop lathes from storeroom. Its narrow size is determined by the existing aisles in the plant. The small dolly costs $50 and has a 1500-lb. capacity. The large one costs $80, handles 2,500-lbs. **The three-wheel dolly (above, middle)** is used to move in-process machines down the assembly line. A worker rolls the dolly up to the machine, and slips it under when machine is tilted. Not shown is a long-nosed special 3-wheel hand truck, developed after a worker sprained his back while moving a heavy machine to a new floor position. **At Moncreif Furnace another problem (above, right)** was solved through a specially designed piece of equipment. At the end of the company's self-built semi-automatic production line is a packaging station. Loading ten 5-ft. lengths of duct into a carton was difficult in a vertical position. Moncreif's solution: pack it horizontally. On the special table is a pneumatic ram. When the ten nested lengths are started into the carton a press of the foot pedal activates the ram, and shoves the ducts the rest of the way into the package.



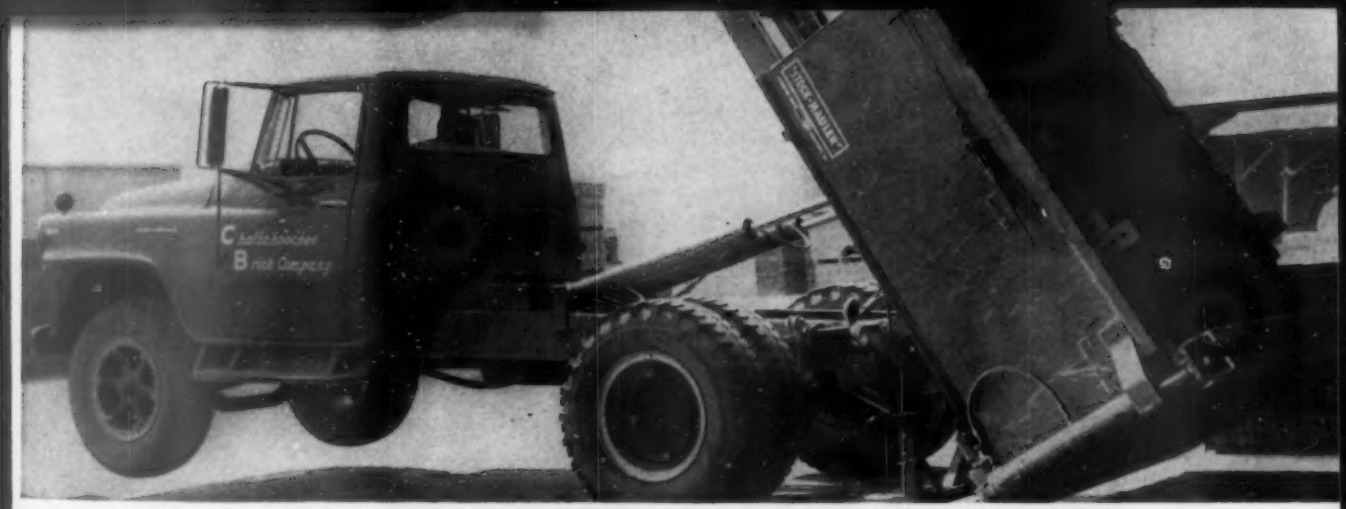
At Atlantic Steel Co. (above, left) one of the handling problems was separating steel billets before they were fed into the wire drawing mill. Long and heavy, the billets were lifted to the head of the drawing mill by truck, then separated and laid flat by hand. Unbundling these hot, 30-ft.-long, 1,500-lb. pieces of metal was a back-breaking and hazardous job for six men. Now the hydraulic billet-unscrambler does the job and requires only one man. Labor saving is about $25,000 per year. Here's how it works: The billets from the nearby billet mill arrive on a straddle carrier. Transferred to a lift truck, they are placed on the highest of the unscrambler's four levels. The workman cuts the bundle wires, steps back to the control levers and the unscrambler takes over. Double action steel arms walk and vibrate billets down the four steps. By the time they have reached the lowest level, the billets are unscrambled, evened, leveled, and ready to feed the mill at rates up to 80 tons/hr. The unscrambler, built by Morgan Construction Company, Worcester, Mass. was part of a new mill system. **At Ford Motor Co., the idea is small—but useful (above, right).** Unloading rail cars had always been a problem. Insufficient light inside the cars made it hard for the fork truck operator to operate efficiently. The use of a special light fixture now corrects this. Swivel brackets along the dock can be pulled inside a car at any location. It is easy to switch the light to wherever needed inside the car.

. . . MATERIAL HANDLING IN **ATLANTA**

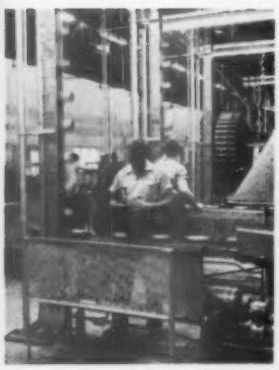
Standard equipment is less expensive, sometimes more useful than custom-made. Use of standard items helped solve these problems.

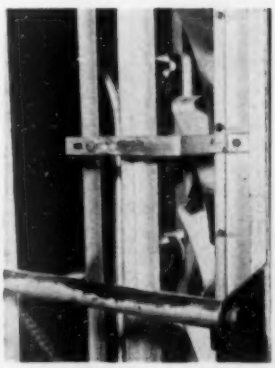
In their warehouse, Reynolds Aluminum Supply Company (below, left and right) processes coil stock, stores many items for the building trade. One of the standard items available was pipe fittings. Made of aluminum and magnesium, these slip-on fittings are often used for railings. Reynolds saw a better use. Now they have assembled flexible storage racks for everything in the warehouse (left). The capacity and size of the racks are limited only by the strength of pipe used. The pipe is held in position by set-screws of hardened steel, eliminating costly threading or welding. The storage racks, and other structures of fittings and pipe, may be adjusted with minimum effort. With slight exception all the rack materials are salvageable. Using these low cost, heavy load carrying cast aluminum and magnesium fittings, Reynolds Aluminum Supply has developed over 20 standard storage rack designs, each for a specific item in inventory. **Rack pictured below, right** stores "Colorweld" coil produced within the same warehouse-plant. It costs $425 and has a working capacity of 2500 bls. of skidded coil per opening.

Radio contact between cranes (below, left) is the only way Lockheed can coordinate activities at their Marietta plant outside Atlanta. Under 57 acres of continuous roof, the airplane company requires 24 cranes in seven bays to help produce the giant Hercules transports and new Jetstar executive aircraft. Not all cranes are in simultaneous use at present, due to military cutbacks. But radio still coordinates those cranes in use over a two-way network. Radios also are used to coordinate the movement of material handling trains and other rapidly moving vehicles in their passage throughout the plant. Each material handling system has its own radio channel. **At Coca Cola's home syrup plant in Atlanta (below, right)** its big material handling problem occurred in shipping. Drums of syrup were filled on the main floor. But the shipping area next to it was six feet higher. In the processing area stainless steel drums had been rolled on their own built-in rubber tires for 12 years. Coke felt that the same technique could be used in the shipping area too. Question: how to lift them up to the higher level at the lower? The ingenious use of a standard fork truck solved the problem. Now with a well-developed technique the fork truck operator scoops up two filled drums. As he wheels the truck toward shipping he raises the two drums at the same time. When he arrives at the elevated shipping platform, he stops. The drums continue on at the higher level to the drum handler who stacks them.



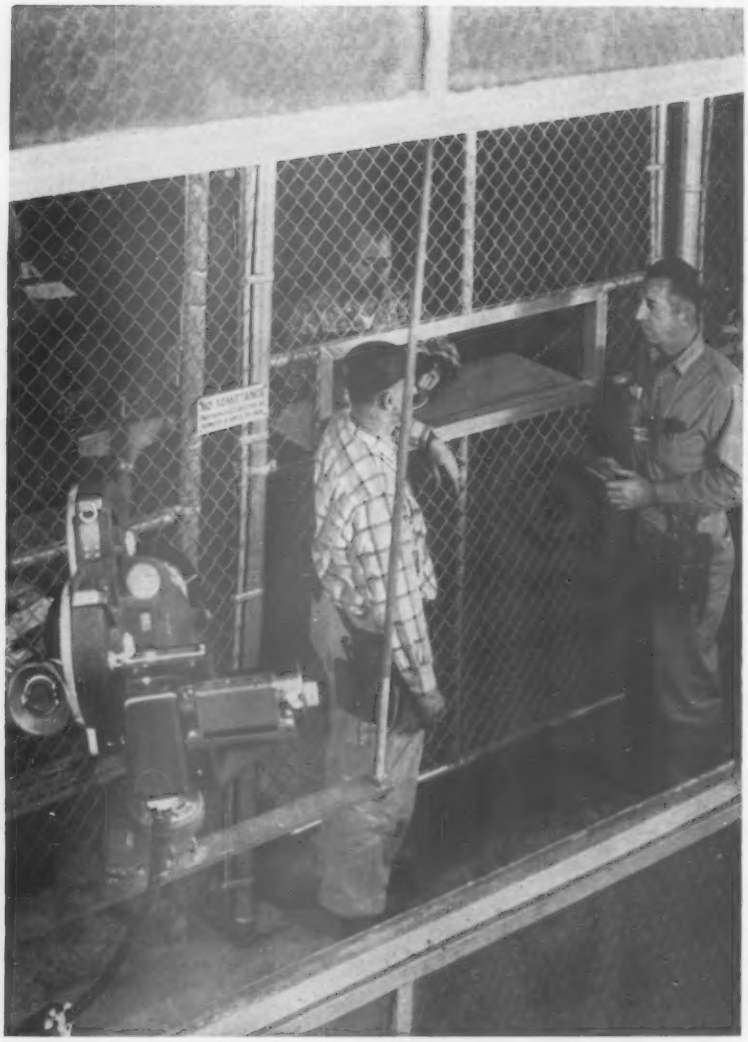
Chattahoochee Brick Company uses an automatic brick-loading attachment on their trucks (above). It saves two workmen per truck in unloading and eliminates 1,500 outside pallets. Key to the system is a truck bed that moves from the horizontal to the vertical. The truck driver backs the trailer with the bed in a vertical position until the truck envelopes the pile of 3,000 bricks. A hydraulic-operated bar clamps the bottom row of bricks against the bed of the truck and the bed returns to horizontal. Because the weight of the bricks lifts the front of the truck, a steel plate under the rear helps take up weight of the bricks. This standard truck (produced by American Body Truck, Martinsville, Va. for 10 years) will haul double the daily load volume of a conventional hand or lift truck hauler. Chattahoochee has found a significant reduction in brick chipping and breakage with the unloader, too. The particular truck above is a beefed-up unit for yard hauling. It is sturdier than the over-the-road version because it must daily pick up and set down many times the number handled by a road truck. John Winn, plant superintendent, says without the unloader it would require tying up a lift-truck operator and truck driver, and together they could not attain the 3,000 bricks in three minutes rate of the unloader. A lift truck would cost as much as the self-loader. Road units cost $4,000. The beefed-up yard unit costs $6,000. Chattahoochee uses a total of 10 units equipped with the automatic loaders.





At Crown Cork and Seal Co. (above, left and center) the production rate of 12-oz. cans is so high it would be impossible to find room to move people, raw materials or maintenance equipment and the cans across the floor. So Crown decided to move the cans vertically from the can-making machines to the automatic painting, packaging and palletizing operations. High speed magnetic belts (left) and parallel rubber belts (middle) pressed against the cans by springs of shim stock dimensions, carry the cans up and away from the machines. Then they move across the plant near the ceiling, descending at the next work station. **Lockheed has another ingenious material handling development (above, right)** at their Marietta plant. This time they have modified standard equipment for better utilization. They have just completed a $10,000 job of converting 150 standard four-wheeled carts into three-shelf tow train carts. Throughout the plant one or more rubber-tired tractors are continuously making the rounds of the plant. They tow behind them up to eight of these converted carts, depending on the particular loads. The same system is used outdoors. Here the load depends on the proposed speed of the tow train, and the relative smoothness of the paved yard. Use of this patrolling technique reduces waiting time at the crib. With good communications such as two-way radio (facing page), most stock can be delivered right to the job without any delay.

Automatic



Every 20 seconds the camera (above, left) clicked a picture of action at a stores window in Western Electric's Burlington, N.C. plant. When workers and managers studied the complete film, here's what they saw:

- *Attendants saw themselves doing extra walking.*
- *Craftsmen saw they were making needless trips.*
- *Management saw the need to expand the storeroom.*

eye spots maintenance shortcuts

A slow movie camera can give you fast benefits. Especially when you want to take a hard look at long, involved jobs that defy stop-watch analysis. Maintenance work is a perfect example.

Because maintenance is done by craftsmen, who often have their own pet ways of handling things, it's pretty rough to analyze their work. Besides, they may do a lot of walking and waiting in a day's time.

The solution: a special type of stop-motion photography called **memo-motion.** It's a technique for studying the main activities involved in any operation. It differs from micro-motion studies, which are most useful for timing and analyzing production jobs. Both techniques use time-lapse motion pictures. But with micro-motion, you examine the *details* of the job. With memo-motion, you look at the **main activities** involved.

THE ADVANTAGES

It's fast. Memo-motion pictures are taken at a rate of about one frame every 20 seconds (conventional movies eat up 16 frames per second). You can get a whole day's activity on one roll of film. Careful, frame-by-frame analysis of the film gives you a fast, complete picture of what's going on and everything that affects it. Example: one Union Carbide job—including both taking a movie and its later analysis—would have taken 170 hours with conventional methods. Memo-motion took just 38 hours.

It's cheap. Memo-motion slashes costly analysis time. Industrial engineers are free to use their heads, not their stop-watches. The camera is easy to set up, runs by itself, and uses only 6% of the film needed for regular movies of the same thing.

It's adaptable. You can edit the film to select certain elements and throw out others, without affecting your data. This can't be done, of course, with stop-watch studies, where an activity, once timed, can't be sub-divided.

It's permanent. You can study the film repeatedly, looking for improvements or wasted motion you missed the first time—and would surely miss by direct observation. Your permanent record can also be used for training, for "selling" the need of new equipment or methods, even for arbitration.

WHAT YOU NEED

A 16 mm. camera with lenses and filters, a time-lapse motor drive (intervalometer), a special 16 mm. projector, film, screen, and an exposure meter should put you in business. You'll also need cords and mounting hardware, and perhaps a splicer, tripod, clock, and so on. Total cost: $1500 to $2500. And don't forget that the equipment, once purchased, can be used for industrial relations, safety, and training programs as well as for memo-motion work.

THE HUMAN FACTOR

For real effectiveness, you *must* have the support of maintenance management and the hourly people affected. Making a memo-motion study is not spying. Inefficiencies are usually the fault of management—poor layout, techniques, planning—rather than the fault of workers. Normally, your maintenance men are as irritated by delays as you are.

Anxiety and suspicion can be headed off by informing craftsmen about what's going on, and why. Tell the unions what you're up to, what you're looking for, to gain their support. Show the film to workers, to convince them that you're looking at events, not at individuals. Besides, craftsmen have been known to put an experienced finger on waste and awkward motion that the IEs overlooked. Of course, if you *intend* to spy, you deserve resistance, and you'll get it. Try to improve the operation, not the men doing it.

Caution: If you use this technique for comparing worker effectiveness or for work measurement, be sure to announce these objectives in advance. If the men involved don't trust you, they'll find plenty of ways to defeat you, the camera, and the study.

WHERE TO USE IT

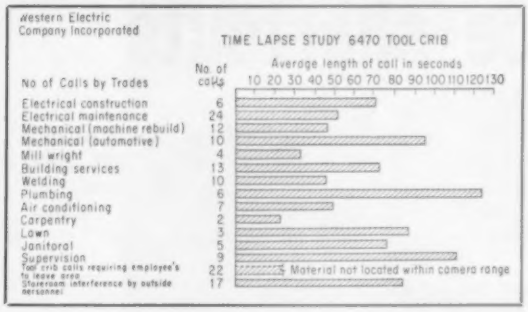
Memo-motion is attracting a lot of attention in maintenance circles. In addition to being quick, cheap, and effective, it has a built-in bonus . . . the action is tremendously speeded up, so wasted motion sticks out like a crow on a snowdrift. Among the studies for which memo-motion is proving useful are:

- Long-cycle operations
- Multi-man (and over-manned) crew activities
- Multi-machine operations
- Irregular-cycle (non-standard) operations
- Irregularities in normal operations
- Inter-departmental interference and delay
- Shop layout
- Materials handling
- Tool and equipment utilization
- Hazards analysis
- Maintenance work measurement

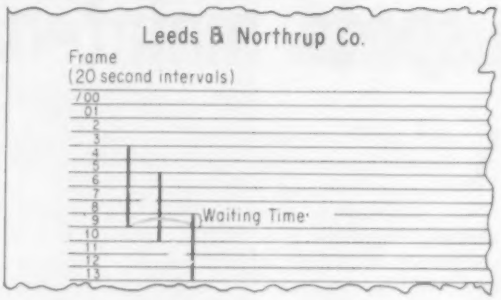
For two examples of how memo-motion has been used to improve maintenance storeroom activities, **turn the page.**

*With **memo-motion**, management studied these maintenance tool cribs at two plants. Results showed that . . .*

This one was a bottleneck . . .


Western Electric Company Incorporated
TIME LAPSE STUDY 6470 TOOL CRIB
No. of Calls by Trades
No. of calls
Average length of call in seconds
10 20 30 40 50 60 70 80 90 100 110 120 130
Electrical construction 6
Electrical maintenance 24
Mechanical (machine rebuild) 12
Mechanical (automotive) 10
Mill wright 4
Building services 13
Welding 10
Plumbing 6
Air conditioning 7
Carpentry 2
Lawn 3
Janitorial 5
Supervision 9
Tool crib calls requiring employee's to leave area 22
Storeroom interference by outside personnel 17
Material not located within camera range

but not this one.



Management at Western Electric's Burlington (N.C.) plant suspected their maintenance storeroom of being a bottleneck that might put a crimp in some new procedures they wanted to establish. Before they could take effective action, they had to know:

1. **How many calls were handled in a normal day**
2. **The frequency and duration of these calls**
3. **If there were any regular rush periods**
4. **The activity pattern of storeroom attendants**
5. **What trades made the greatest number of calls**
6. **If material could be pre-selected for a job**
7. **If additional storeroom space was needed**

Analysis of memo-motion films of the storeroom operation provided quick, accurate answers.

First step was to gain acceptance of the study. Personnel involved were briefed by their supervisors about the scope and purpose of the project. Payoff was expected to come from better management, not from more pressure on the maintenance crews.

The camera was mounted to give an unobstructed view of the storeroom, and took one frame every eight seconds. In the two day study period, 6800 observations were made, and the results were studied with a special slow-speed movie projector.

The evidence was conclusive. Pre-selection routines would work, and they'd help. Additional space was needed, since attendants had to leave the storeroom too often for items not kept on hand. Interference by personnel with no business in the area was complicating matters. Another attendant was needed at peak periods.

The film was also shown to the men in the shop. This paid off twice. First, the men were able to see ways to improve the operation on their own. Several saw themselves making unnecessary trips to the storeroom, as a result of not getting complete tools and supplies the first time. Second, the fact that management let them in on the project proved that their importance was recognized.

H. P. Breeze, head of industrial engineering, and J. M. Link, Chief of the plant department, now intend to use memo-motion to set maintenance job standards, smooth employee and material traffic flow, and promote safer working conditions.

Leeds and Northrup (Philadelphia) wondered if it would pay to put another attendant in its maintenance toolroom. Workmen seemed to be spending a lot of time waiting in line at the toolroom windows, even though the two attendants were known to be real hustlers.

To make a decision, the managers needed to know:

1. **Total waiting time (men just waiting in line)**
2. **Total service time (men actually being served)**

To get either figure, the industrial engineers needed accurate data. F. A. Cline, Jr., and R. J. Haddad, of L&N's Industrial Engineering Department, decided to tackle the job with memo-motion.

First step was to win acceptance of the study. Management and labor were informed of the procedure, and the union was invited to participate in the counting. The union accepted, sat in on a brief sampling, and satisfied itself that the only objective of the study was to reduce wasted time.

The camera was mounted to show only the backs of the men, and set to take one frame every 20 seconds. Fast film made special lighting unnecessary.

Memo-motion films were viewed one frame at a time. When a worker appeared in a photo of the waiting line, the observer put a short vertical line after the frame number on a chart. This line was extended for each subsequent frame in which the worker appeared. The impersonality of these lines convinced the union that management was not spying. A hooped line shows that an attendant finished serving one man, and went on to another, who had been waiting.

After adjusting for abnormal situations, such as waiting for a tool that was not in stock, L&N found its mean average service time was 1.1 minutes. The average time between arrivals: 2 minutes.

By plugging these figures into a standard waiting time formula L&N found that the probable waiting time per man was only 0.088 minutes. This meant a shop total of only 20 minutes per day. There was clearly no need for another window attendant. On the other hand, if one of the present attendants were taken out of the crib, the total waiting time would increase to five hours per day.

Verdict: present two-man set-up is just right.

PAY RATES FOR KEY INDIRECT JOBS—IN 9 CITIES

All figures are average straight-time earnings in manufacturing industries except figures with asterisk, which are for all industries. They include incentive pay, if any, but not overtime, weekend holiday, or night-shift premium.

Weekly earnings are average salaries for standard work week.

MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN

	ALBUQUERQUE MAY '60	ATLANTA JUNE '60	CINCINNATI FEB. '60	CHICAGO APRIL '60	HOUSTON JUNE '60	LOS ANGELES APRIL '60	MILWAUKEE APRIL '60	NEW ORLEANS FEB. '60	NEW YORK APRIL '60
MAINTENANCE AND POWERPLANT: Average straight-time hourly earnings									
Carpenters, maintenance	$2.78*	$2.34	$2.65	$2.89	$3.09	$2.82	$2.84	$2.48	$2.78
Electricians, maintenance	3.02*	2.85	2.84	3.05	3.13	3.05	3.01	2.78	2.91
Engineers, stationary	2.79*	2.86	3.04	3.02	2.63	3.12	2.86	2.05	3.22
Firemen, stationary boiler	——	1.73	2.48	2.46	——	2.87	2.47	2.07	2.79
Helpers, trades, maintenance	2.24*	1.96	2.12	2.44	2.48	2.43	2.15	1.97	2.21
Machinists, maintenance	——	2.54	2.81	3.08	3.04	3.01	3.17	2.75	2.90
Mechanics, automotive, maintenance	2.52	2.22	2.71	2.99	2.61	2.90	2.81	2.13	2.80
Mechanics, maintenance	2.99	2.31	2.58	2.81	2.90	2.84	2.80	2.56	2.77
Millwrights	——	——	2.86	3.01	3.21	3.01	2.88	——	2.83
Oilers	2.16*	1.96	2.41	2.39	2.31	2.32	2.53	2.06	2.37
Painters, maintenance	——	2.76	2.70	2.84	3.11	2.80	2.88	2.62	2.64
Pipefitters, maintenance	——	2.89	2.93	3.05	3.21	2.99	2.94	2.79	2.75
Sheet-metal workers, maintenance	——	——	3.00	3.06	3.25	3.02	2.97	——	2.79
Tool and die makers	3.35*	2.95	2.96	3.25	2.98	3.09	3.32	——	3.03
CUSTODIAL AND MATERIAL MOVEMENT: Average straight-time hourly earnings									
Guards	——	2.44	2.33	2.22	2.53	2.34	2.22	2.19	2.08
Janitors, porters, and cleaners	1.63	1.60	1.90	1.92	1.75	2.06	2.05	1.54	1.79
Janitors, porters, and cleaners (women)	1.30*	1.24	1.64	1.75	1.50	1.93	1.88	1.21	1.66
Laborers, material handling	1.68	1.46	1.98	2.06	1.53	2.23	2.20	1.56	2.08
Order fillers	1.76*	1.56	1.84	2.13	1.70	2.12	2.20	1.40	1.81
Packers, shipping	——	1.69	1.71	2.02	1.45	2.16	2.23	1.60	1.75
Packers, shipping (women)	——	1.39	1.83	1.85	——	2.06	1.87	.98*	1.74*
Shipping clerks	——	1.93	2.12	2.52	1.94	2.29	2.42	1.87	2.25
Shipping and receiving clerks	2.14*	2.32	2.29	2.33	2.17	2.35	2.47	1.93	2.18
Truckdrivers, light (under 1½ tons)	2.03*	1.40	1.90	2.87	1.66	2.32	2.30	1.47	2.29
Truckdrivers, medium (1½ to and including 4 tons)	1.94	1.49	2.27	2.67	1.68	2.64	2.40	1.65	3.05
Truckers, power (forklift)	2.20*	1.89	2.28	2.40	2.36	2.39	2.44	2.02	2.56
Truckers, power (other than forklift)	——	1.65*	2.18*	2.42	——	2.32	2.35	1.82*	2.38
Watchmen	1.72*	1.37	1.79	1.90	1.48	2.02	2.05	1.55	1.77

FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN

OFFICE, PROFESSIONAL AND TECHNICAL: Average straight-time weekly earnings									
Comptometer operators	63.50*	78.00	71.00	80.50	67.00	87.00	70.00	68.50	80.00
Draftsmen, senior (men)	——	117.00	115.00	120.00	108.00	115.50	117.50	122.00	119.50
Draftsmen, junior (men)	87.50*	89.00	91.00	89.00	80.00	92.50	93.00	91.00	83.00
Duplicating-machine operators	——	59.00*	62.50*	66.00	56.50*	73.00	62.50	——	63.50*
Key-punch operators	73.50*	81.00	73.50	75.50	80.50	82.00	71.00	72.00	70.50
Nurses, industrial (registered)	——	98.50	93.00	95.50	106.00	102.00	89.50	95.50	100.50
Office girls	——	52.50*	49.00*	61.50	52.00*	65.50	58.00	43.50*	60.00
Payroll clerks	79.00*	69.50	74.50	80.00	83.50	86.50	72.00	64.50	79.50
Secretaries	97.00	86.00	89.50	94.50	93.00	96.00	91.50	85.50	95.00
Stenographers, general	75.00*	78.50	72.50	78.50	82.00	84.50	74.50	67.50	79.00
Typists, class A	71.50*	75.50	72.50	74.50	71.00	83.00	76.50	75.50	76.00
Typists, class B	55.50*	60.00	60.50	66.50	56.50	72.00	63.00	60.00	66.50

The maddening whirl—indirect labor costs

As the year comes to an end, many businessmen are about to face some disappointing balance sheets. The big boom of the sixties has shown distressingly few signs of living up to its enthusiastic prediction. Why?

Here may be one reason—indirect labor costs. These exclusive figures, supplied by the U.S. Department of Labor's Bureau of Labor Statistics, conclude FACTORY's 1960 reportage of these vital non-productive labor costs. To compare specific cities, see the April issue, page 110; June, page 100; and July, page 93.

STOP EXPLOSION DAMAGE IN YOUR PLANT

Anti-explosion system includes detector (center) and protective components such as suppressant (hand held), isolation valve (left), inert gas container (right).

Here's explosive news, especially if you have your fingers crossed against something blowing up in your plant. It's a protection system that will snuff out a blast before it can become destructive.

Called the Fenwal automatic explosion protection system, it prevents damaging blasts in flammable liquid storage tanks, dust extraction and collection systems, chemical reactors and converters, pulverized fuel hoppers, spray and drum driers, and enclosed crushing or grinding operations. The system squelches all explosions of oxidation-type origin, can't stop decomposition-type. It operates well in temperatures from about −100 to +500 F. and in pressures up to about 1000 psi.

The principle has been successfully applied in England since World War II. Subsequently the Graviner Mfg. Co., Ltd. of England adapted this system to industrial use, and engineered many successful British installations against losses of several million dollars.

The principle of operation—It's a fact that oxidation-type explosions are not instantaneous. There is a lapse of 30 to 40 milliseconds between time of ignition and build-up of destructive pressures. It is during this lapse that the protective system operates. Within a few milliseconds after the birth of an explosion, a super-sensitive detection device triggers a counter explosion in each piece of protective equipment to release damping agent, close valves, or open explosion vents. These all happen before the primary explosion can build pressure to the danger point.

Each protection installation must be designed to meet the needs of the specific process or equipment. But every system consists of a combination of three basic components, mounted at the potential damage site:

1. Explosion Detector. This is either a pressure-sensitive or a photo-cell device. An increase in pressure (rate-of-rise or static, or both), or a minute explosive flame (if photocell) causes it to trigger an electrical signal that activates all other components in the system.

2. Power unit. The power unit unleashes a hot electrical charge, to set off the various protective components. Stand-by batteries guard against power failure.

3. Protective components. Chief among these is the suppressor. It contains a liquid suppressant, such as water, "CB" (chlorobromomethane), or even the medium being protected (such as gasoline). The container is an easily ruptured hemispherical shell. Its contents are dispensed in fine particles at a speed up to 600 feet per second (as compared with 10 to 20 feet per second speed of explosion propagation). Purpose is to cool the remaining explosive mixture, or enrich its mixture to a non-explosive status, or to inert the entire area. This speed of distribution is achieved by an explosive detonator built into the suppressor, similar to a precision electric blasting cap. Only 5 cc. of water or 2 cc. of CB are needed to squelch an explosion in a one-gallon enclosure. Reactivation of the system takes little time.

Other protection devices include isolation valves to prevent spreading of the explosion through ducts or pipes; venting devices to relieve critical pressure; and discharge bottles to emit large quantities of suppressant for inerting primary or secondary areas against re-ignition. All these components also are operated by counter-explosion detonators for split-second actuation.

Cost varies with each installation. Several recent chemical installations cost 5 to 10 thousand dollars.

Says the National Fire Protection Association: . . . We look upon explosion suppression equipment (such as Fenwal) as an important adjunct to a well-rounded explosion control program . . .

PROBATIONARY PERIODS
CHANGING WORK GROUPS
QUITS AND DISCHARGES
LAYOFFS
MANAGEMENT NEWCOMERS
FRINGE BENEFITS
VACATIONS
DISCIPLINARY LAYOFFS
TRANSFERS
JOB DISPLACEMENT
JOB BIDDING
SHIFT PREFERENCE

SENIORITY

Even the mildest seniority clause in your labor contract is an affront to good management, in theory at least. It assumes that an employee is to be judged and rewarded, to a major degree, on simple length of time on the job rather than ability and attitude. Does this mean the whole concept of seniority is a ball-and-chain impeding effective plant operation? Or is it, on the whole, an orderly stimulant to good organization? Or can it be helpful or harmful, depending on its use? In the following four pages, FACTORY tries to answer these questions and show how to put seniority to work constructively.

SENIORITY . . .

Here's help in solving

PROBATIONARY PERIODS

How can management make the best use of them?

The probationary period is vitally important to first-line supervision. Make sure each new employee is carefully watched and shows genuine signs of ability, sincerity and an understanding of what is expected of him. Distinguish this from the universal probationary spurt during which an employee will make his best appearance in his first days on the job.

Resolve doubtful probationary employees in the company's favor; there are more and better candidates waiting to be hired. The union will usually agree with this. Stewards don't want to acquire disciplinary headaches any more than you do. So make sure the new employee passes careful management scrutiny *before* his probationary period ends. This can usually be done without changing anything in your existing contract.

PROBATIONARY PERIODS

How long should they be?

Get a long probationary period, say some plant management folks, and give yourself the maximum time to see what a man can do. Sound in theory, this doesn't always work out in practice. It shouldn't take too long for the first-line foreman to evaluate the new man. Long probationary periods may simply delay his decision, wasting valuable training time and money. If you already have a long probationary period, emphasize that supervision need not wait until the last minute to decide.

When you're hiring new employees for both unskilled and highly skilled work, logic dictates a shorter probationary period for the former—especially if your skilled work involves extensive adaptation to your methods.

CHANGING WORK GROUPS

Does seniority carry over from one work unit to another?

To management, an employee is just as loyal and deserving a worker regardless of how many different work groups he passes through. But unions may insist that seniority applies only to time worked within the unit.

Transfers from one union jurisdiction or contractual coverage to another frequently occur in cases of swift expansion or curtailment of part of your operations. Where matters cannot be easily resolved without injuring too many union prerogatives, it's sometimes possible to preserve certain rights for the transferred employee (vacation benefits, sick leave, pension rights) while requiring him to start over on other rights, particularly job tenure, job bidding, etc. A touchy one, often highlighting the fact that the union's regard for the long-service employee may mean only "How long has he been paying dues to us?"

QUITS AND DISCHARGES

What happens to accumulated benefits when a worker leaves?

It's what happens *just prior to* or *at the point of* voluntary or involuntary termination which creates wrangles vexing enough to perplex the most experienced arbitrator. A laid-off employee is recalled to work; he comes back, works one day, quits and claims two weeks' vacation pay as he goes out the door. An employee discharged for embezzlement seeks accumulated sick leave credits and vacation pay even as he is escorted to the paddy wagon. Fantastic? Not if your labor-management contract has failed to anticipate such situations.

Along with the well understood principle that an employee quitting or being discharged loses further seniority rights, it's worth thinking through what happens to rights he may have accumulated up to the point of termination. You may wish to swallow hard, and not make any special provisions. On the other hand, disqualifying the employee who quits or is discharged from certain rights may be a small but useful factor in reducing turnover and preventing misconduct.

And strange as it may seem, there is sometimes an arguable point as to whether an employee's action constitutes a quit or results in a discharge. Labor contracts frequently provide that an employee who fails to report in for a certain number of consecutive days is out of a job. But has he quit? Spell out that such action *is* grounds to consider him as a quit rather than a discharge, which is usually subject to grievance machinery.

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the knotty problems of seniority

LAYOFFS

How is a man's seniority affected by a layoff for lack of work?

The employee who is laid off solely for lack of work normally retains seniority rights to return to work when production increases. Desirable for the employee, this is also worthwhile for management if it is to retain its skilled help over the long pull. Without retention of seniority rights, many laid-off employees would have little incentive to return to their old jobs, particularly if they have found some other position in the meantime. Two questions apply, however: How long a period of layoff should be permitted before the employee loses recall rights? Should he accumulate seniority rights while on layoff or merely be permitted to pick up where he left off upon return to work? The two questions go hand in hand. A company which restricts recall rights to, say, six months, can probably afford to have the employee continue to accumulate seniority rights (including rights toward vacations, pensions, etc.) without too much harm.

Especially in the face of automation, where temporary or permanent work force reductions may occur without decline in production levels, unions are understandably more eager than ever to extend the length of recall rights. You may well find it desirable to go along with this, but may wish to put a limit on accumulating *additional* seniority during the layoff period. Another suggestion: extend recall rights for longer-service employees who are laid off, but continue present recall policy for shorter-service employees. If you're not careful, you may find yourself giving employees layoff status rights of longer duration than their actual active employment period.

MANAGEMENT NEWCOMERS

What happens to seniority when a man is promoted out of the working ranks?

The large majority of union contracts and company policies provide some sort of seniority protection for the employee who enters management ranks and then, for one reason or another, returns to his original work group. But this is the basis for a worthy argument among management theorists. Protect the man coming up from the ranks, say many, for if we have to cut back our management force or if we've made a misjudgment in picking him, he ought to have the right to return to his old status without penalty. Also, having the knowledge of this protection will encourage many hourly employees to accept management offers which they might otherwise decline.

Nonsense, say others. A man good enough for a management job should be ready and willing to leave his rank-and-file connections entirely behind him and take his chances (just as do other management folks hired from the outside). And with one foot in each yard, the worker-turned-foreman splits his allegiance.

So it goes, and must be decided as it best fits your own situation. If seniority rights upon return to the work unit are involved, the further area of dispute is whether the employee should continue to accumulate seniority while in management or whether his seniority is frozen as of the time he leaves the unit.

If your labor contract or company policy does give full protection to the management man to return to his previous status, ask yourself if you are using this as a ready excuse to pick up mediocre supervision (since your conscience is clear upon returning them to the unit).

FRINGE BENEFITS

Is there any point in tying these to seniority?

Holidays, insurance benefits, supper money, and the long, long line of etceteras which make up modern factory fringe benefits rarely, if ever, are tied to seniority. Again a suggestion: perhaps you can buy your way out of some sticky contract clauses on seniority by offering certain increased fringe benefits varying with length of service. It may hurt efficiency to give invariable preference to the senior man in job vacancies. He might be willing to give a little on this in exchange for, say, an additional holiday or higher disability benefits for employees with more than a decade of service.

Turn the page

VACATIONS

How do you handle the preference of vacation dates?

Most companies (except those with plant vacation shut-down periods) give senior employees first preference on choice vacation dates, on a departmental basis, if not plant-wide. Again there are logical arguments, but there is something to be said against it, too. If you have a fairly stable work group, growing older in service as a group, this system denies younger employees (those most often with school-age children) a chance at choice vacation dates for what may seem to them an endless succession of years. So some contracts provide for regular rotation of vacation dates regardless of seniority. Compromise worked out by some: where long service employees are entitled to three or four weeks' vacation, they are permitted top-dog choice of dates on only two weeks of the vacation, with the rest coming at a less desirable time.

With the hourly worker, as with management folks, scheduling of vacation involves lots of personal planning. Conflicts often cause real emotional blowups. So, whatever your system, make sure it is understood by all and put into effect as early in the vacation year as possible.

DISCIPLINARY LAYOFFS

Can you use out-of-seniority layoffs to get rid of deadbeats?

Reducing the work force is never a pleasant task, and it seems reasonable for management—as well as the union—to confine the rupture to the least senior employees. But management frequently faces this kind of foreman complaint: "I know Bill is the junior man in my department, but I sure wish I could lay off Joe instead—he's never even got his production up to standard in all the time I've had him. Can't we lay him off instead?"

It's only the rare instance where you can help solve this foreman's problem in the way he suggests. He is trying to solve a disciplinary or training problem at the one wrong moment—layoff time. Poor performers must be helped or removed during the course of their regular work. Trying to correct matters through out-of-seniority layoffs rarely solves anything.

VACATIONS

Is this always an open and shut case for seniority?

Vacation benefits generally increase with length of service as the only determining factor. This is reasonable, and a tangible attraction to the experienced worker with the company. Unequal vacation benefits among workers rarely cause dissatisfaction, since longer vacations are something which the new worker can look forward to merely by the passage of time.

If your union is pressing for tighter seniority provisions which might jeopardize efficiency, you have a reasonable counter-offer in terms of longer vacations for top seniority men—especially if the cost of the vacation improvement is costed into your overall wage package.

TRANSFERS

Why is it important to maintain the distinctions between permanent and temporary transfers?

A permanent transfer usually is subject to the same seniority rules as bumping or even layoff, because the long-term status of the employee is affected. The temporary transfer, on the other hand, usually preserves for the employee his former rate of pay, overtime rights, and other privileges including the right to return to his permanent assignment after a specified period (usually ranging from one week to a month). Managements are frequently able to avoid the intervention of seniority rules on temporary transfers since there is no significant effect on the employee.

Wise managements plug for widest possible freedom in temporary transfers, as such moves often spell the difference between meeting a rush work schedule or missing it. So any yielding during contract negotiations leading to tighter security on *permanent* transfers could reasonably be accompanied by a loosening of the reins on *temporary* moves.

We all dislike disturbance of our daily routine, particularly when it involves no foreseeable benefit to us. The *right* to transfer ought to be carefully preserved; but the *practice* of movement of manpower from one job to another ought to be minimized without sacrificing efficiency. Excessive transfers can lead to discontent and eventually to some pretty stiff collective bargaining demands.

JOB DISPLACEMENT

Does seniority force you to keep the wrong man on a job during a layoff?

As a part of reduction in force, displacement of junior employees on operating jobs by senior employees whose jobs have been suspended or eliminated is always a thorny situation. Procedure, rules, and contract clauses on such "bumping" vary from no displacements permitted to automatic displacement by seniority. Can a man bump outside his department? Can he bump a job he has never performed? Can a non-bumpable fence be staked around certain key jobs? Answers to these and other questions are usually developed over years of plant practice. So complex are the rules of the game that it takes an astute Personnel Department to play.

One common and perhaps desirable middle ground is to permit bumping (thus giving a break to the senior man whose job is abolished), but to insist that the man who bumps must be immediately qualified—or can become qualified within a short, specific period—to handle the job he takes over.

Here are three reminders about this touchy problem:

a. Make sure your personnel people are building up *consistent* practices on bumping, ones you can live with, ones which can be defended if the union challenges through the grievance procedure.

b. If you have a time limit on qualifying for a new job, insist on it being met or move the man out; don't let the training period become more and more elastic.

c. Remember that bumping is not all bad; frequently it creates a versatile body of employees, trained in several skills, who can move quickly from one job to another to meet production requirements.

JOB BIDDING

Are there ways to protect your prerogative on who gets better jobs?

A workable clause requires attention to seniority in job bidding if other factors—experience, ability to learn, availability from present job—are relatively equal. Job improvement is one of the few areas where management can still reward the good, ambitious worker; where, in other words, the employee with old fashioned git-up-and-go still has some chance to make his energies and experience pay off. It's worth holding on to.

If the union calls you through the grievance procedure on a supposed contract violation, it is usually up to the union to make a case. But in selection of employees for better jobs (as well as in disciplinary matters) it's up to management to prove its case. So if you're picking Hot-Shot Charlie over Doleful Dan who has more seniority, make sure you can show specifically why Charlie is better qualified for the job, what past experience merits him the promotion, etc. If you can't prove it, or if it's just because a foreman thinks that Charlie's a better man, you're likely to end up with an arbitrator ordering you to give Dan a chance. One more reason for keeping accurate records of job experience, warning notices, and special training.

SHIFT PREFERENCE

Who's on first—the man you want or the man with more seniority?

Seniority is rarely a factor where employees rotate from one shift to another at regular intervals. Where a plant operates on fixed shifts, it can be a problem. If the senior Widget Operator wants to be on the day shift, it seems unreasonable to keep him on the swing or graveyard shift, with a more junior man on days, just because it fits into a better work pattern. Yet, particularly in times of expansion, granting shift preference often leaves a management with a green crew on the least desirable shift. This effect is softened, in some contracts, by permitting new employees to work on day shift until fully trained; or to require a successful job bidder, regardless of his seniority, to take an open position on an off-shift, even if he is senior to others already on the job.

Sometimes the problem can be overcome by payment of a relatively high shift premium, thus making up in the pay envelope for inconvenient hours; but this can prove expensive. If seniority preference on shifts is a particular problem with you, you might consider rotating shifts. Some plants achieve the best of both situations by shift rotation but only at long intervals (every four to eight weeks instead of every one or two weeks).

You have

HOT, UNCOMFORTABLE WORKERS can cut into your summer output. A new do-it-yourself cost analysis can help you budget air conditioning in time for next year's "dog days."

New evidence is piling up to show comfort air conditioning is a profitable investment and not a luxury.

In a survey conducted by Carrier Corporation, ten plants (see chart at left) got from 26 to 122% annual return on their investment in air conditioning (for production workers). And they made it pay off in one to four years.

Just where does your plant fit into this rosy profit picture? You can find out with a do-it-yourself eight-page, Carrier developed, analysis form. It provides a complete dollars-and-cents investment analysis and arrives at realistic percentage figures of annual return.

Carrier suggests you ask yourself these questions before tackling the form. (If you answer "yes" to two, chances are good that air conditioning your plant will prove profitable).
(1) Do the annual wages of workers in any proposed area, including fringe benefits, add up to $25 or more per square foot floor area?
(2) Does the plant area have one or more persons per 300 square feet of floor space?
(3) Does labor account for more than 25% of the manufacturing cost of your products?
(4) Is your annual voluntary turnover of labor more than 15%?

For additional perspective consider these facts: People engaged in exacting or repetitive work, or where heat and fumes are present, do re-

INVESTMENT RETURN FOR COMFORT AIR CONDITIONING 10 TYPICAL PLANTS

PLANT NAME AND LOCATION	(%) Return on investment *	PERCENT SAVED DURING SUMMER ONLY					
		Improved worker efficiency	Reduced rejects	Reduced cleaning	Reduced training	Personnel expense	Reduced absenteeism
Acme Visible Records Crozet, Va.	35%	12.5%	(All of these benefits are in addition to 35% return)				
Simpson Electric Co. Chicago, Ill.	80%	3½%	68%	50%	6%	33%	
Densal Mfg. Co. W. Springfield, Mass.	122%	(Production up 70%, payroll up 25%, net profit up 83% for July, Aug. & Sept., 1959 versus same period 1958)					
Buxton, Inc. Springfield, Mass.	37%	5%	(All of these benefits are in addition to 37% return)				
Elgin Watch Co. Elgin, Ill.	75%	10%	20%	10%	Large Reduction		
Sylvania Elec. Prod. Altoona, Pa.	30%	5%	80% **		22.6%		20%
Rockwell Mfg. Co. Tupelo, Miss.	26%	4.5% Annually	(All of these benefits are in addition to 26% return)				
Ship 'N Shore, Inc. Upland, Pa.	33%	10% Annually	($15,000 annual training program eliminated)				
Star Machine & Tool Co. Cleveland, Ohio	31%	5.1% Annually			30%		14%
Daystrom Transicoil Worcester, Pa.	41%	2.7%	5%		25%		Virtually eliminated

* Net return, after taxes.

** Rejects resulting from air contaminants

just 8 months to cool off . . .

spond to air conditioning. Production goes up, accidents go down. The picture is not all positive, however. It would be a waste of money, for example, to consider a system in plants ready for retirement or those occupied for only brief periods. And don't allow geographic location, type of industry, or size of your plant to influence your judgment.

What will a system cost? Take a look at the chart at the bottom, right. It shows the actual cost of 19 Carrier installations in plants all over the U. S. and in various industries. Cost here is equated in percent of annual wages, and plotted against worker density (square feet of conditioned area per person). It represents the annual cost of owning and operating each system.

Each is a profitable system. Incidentally, the chart includes the ten plants whose profit statistics you've already seen in the table on the facing page. From this evidence, it's fair and reasonable to conclude that air conditioning pays for itself with a small increase in productivity—2% or less in most plants. Any increase above the break-even point produces real savings.

Now you have enough background information to decide if it's worth your while to fill out the analysis form. All the data you need to complete its five major sections is available from production records or account books. Any plant manager or operating executive should have access to this information. Once completed, the form yields a summary of manufacturing costs before and after air conditioning. Why not get the facts so you can get the figures into next year's improvement budget. Here's a breakdown of the sections.

Section 1. Costs and Profits before Air Conditioning.
Eighteen entries give total picture of output, productive employment, manufacturing costs (including labor, material, overhead, etc.), sales and net profits in dollars for calendar year under study. These statistics serve as a base for calculations and extensions in subsequent sections.

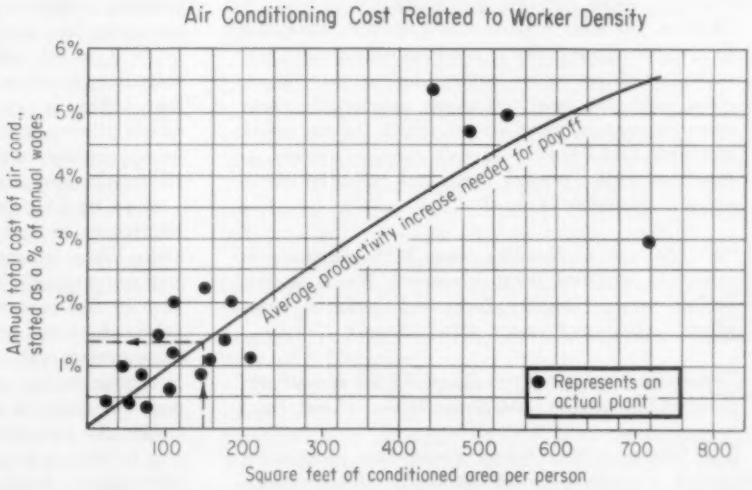
Section 2. Evaluation of Benefits Provided by Air Conditioning.
In this section, you must estimate benefits (based on actual performance figures), expressed as percent of total cost. You derive these from increased output, reduced training expense, fewer rejects and lower personnel costs. Base estimate on inefficient practices due to uncomfortable conditions you think can be eliminated. Result: summary of improvement factors for labor, materials, manufacturing and overhead costs.

Section 3. Net Profit after Air Conditioning.
Incorporating the improvement factors just developed, this section offers you choice of applying them either to (1) maintain current production and employ fewer workers or (2) employ same number of workers but increase production. Either way, a dozen or so calculations produce a dollar-savings figure on "Revenue from Air Conditioning Investment."

Section 4. Total Cost of Air Conditioning.
This section produces figures on total initial investment, annual cost, and expected economic life of the system. A glance at the cost curve in the chart below will give you a rough estimate on investment needed for your proposed air conditioning system. More accurate figures for your plant (that you'll need to complete this section) are available from any air conditioning manufacturer.

Section 5. Return on Air Conditioning Investment.
At this point, sum of annual costs of proposed system—depreciation and operating expenses—is balanced against annual revenue already calculated in section three. It takes seven simple steps to arrive at payback period (number of years required to pay cost) and percent of annual return.

After you've made these 92 entries, you should have proof in black and white whether air conditioning will pay off for you in increased production and worker efficiency. (Form is available from Carrier Corporation, Syracuse, N. Y.).



Curve shows rise in productivity needed to make air conditioning pay off. For example, if worker density is 150 sq. ft./person (see dash line) you need a 1.4% increase.

ROBOT INSTRUCTORS win friends and speed assembly

How would you like to have a *perfect* assembly foreman? One that constantly supervises each worker on the assembly line, never makes mistakes, has endless patience, and is liked by everyone—workers and supervisors alike.

Fantastic? No, this foreman is quite real. Of course, he's too nearly perfect to be human. Instead, "he" is a black box that sits in front of each assembler, telling—and showing—how to perform intricate assembly operations. Result is that production skyrockets, rejects drop to virtually zero, and employee morale is delightfully high.

Consider these startling quotations:

"Before, the most experienced operators were able to achieve about 60% of work standards with less experienced operators falling below this figure. Now, with the new technique, practically every operator can achieve 90 to 100% of the work standard consistently. Defect rate is slashed as much as 99%; rework areas are virtually eliminated." (Hughes Aircraft Co.)

"A 50% cut in learning time; 80% decrease in attention required from leadman. We have improved product quality, increased worker's versatility." (Eclipse-Pioneer Div., Bendix Corp.)

"Inspection manpower reduced 85%; rework reduced 85%; supervision down 70%." (Lear, Inc.)

The hardware that brings about this production miracle is a combination of two pieces of fairly common home entertainment equipment—a color slide projector and a tape recorder. There are several similar units on the market, but they are all designed with the same job in mind—voice and visual instruction of assembly operations. The oldest, and one of the most sophisticated, of these is the Hughes Videosonic unit (above, right).

Here's how it was developed: Five years ago, Hughes Aircraft Co., Los Angeles, began a search for a better method to instruct employees in the assembly of detailed electronic units. The conventional method, then, was to instruct by written text, engineering prints, and verbal instructions. However, these were subject to misinterpretation. Also, because of the growing complexities of electronic assemblies, there were frequent design changes.

As a result, this industry was plagued with an increasing number of frustrating manufacturing problems. What it needed was an instruction device that would allow a relatively uninformed operator to perform, rapidly and precisely, the detailed task of electronic fabrication at top efficiency.

Sired by Hughes, and now spreading through the electronics industry, is the Videosonics concept of audio-visual instruction. This technique automatically presents a specific illustration (colored slide) for each step an operator must perform in what may be an extremely long, involved series of operations. Accompanying each illustration are verbal instructions (magnetic sound-tape) that describe precisely what must be done at each step. Thus, by a flip of a switch, the unit communicates directly with the operator providing a step-by-step comprehensive flow of information. Hughes now has more than 500 Videosonic units on production lines.

While this new concept is hardly off the ground, it

Hughes Videosonics bench-type unit (photos, left and above) contains a slide projector operated automatically, with manual override, and synchronized with a carefully prepared magnetic tape. Colored slides are projected on the glass screen. The magazine contains 36 slides. The tape is a double-track, double-reel, reversible, magazine type. There is a self-contained sound-tape speaker, plug-in jack for lightweight earphones, and a built-in music system. Resembling a miniature television set, the unit has a remote foot control that allows an operator to pace slide changes to her normal working speed. Operation is simplicity itself, requires only that the operator insert the tape magazine in its slot, the slide magazine in its carriage, then flip a switch to start work.

has already caught the attention of the manufacturing industry and the military. It holds definite promise, in many cases, to increase profits, lower costs and better competitive positions. Although enthusiastic about its many applications, its unique solution to production problems, Hughes cautions that audio-visual aids are not a panacea for all assembly ills. Potential applications require study and analysis by trained personnel before plunging into an expensive installation.

Recognizing the myriad commercial applications of its unit, Hughes now has a Videosonics Services Department. (Phillson Ahn, Manager, Hughes Aircraft Co., P. O. Box 90515, Los Angeles 45, Calif.).

Lear, Inc., Grand Rapids, Mich., has been actively engaged in the development, test and manufacture of similar devices during the past four years. They are marketed under the name "Lear-O-Aide."

Nortronics Division of Northrup Corporation, Hawthorne, Calif., initiated the use of five audio-visual units in April of this year. Within three weeks, observations and comparisons of performance of the system provided evidence of significant improvement over the conventional Electronic Production Analysis (EPA) text manuals.

A newcomer to this A-V field, although staffed by experienced, ex-Hughes personnel, is Applied Communications Systems (FACTORY, Sept., 1960, p. 90). Among the first to begin commercial marketing of these production systems, ACS combine a newly designed work station with its instruction unit. The station was meticulously designed on the basis of careful micro-motion studies which organize an operator's work space in the most efficient manner.

Manufacturing's Pandora's Box: A-V aids (motion pictures, strip films and color slides—all with sound) have long been recognized as valuable methods of communications to accelerate the rate of learning, improve the understanding of individuals. However, it remained for Hughes to discover the technique of applying A-V to complex assembly operations and production training.

"I consider Videosonics the first major breakthrough in industrial engineering since micro-motion study; the study of incremental task elements by means of motion pictures," W. A. Harker, manager industrial engineering, Ground Systems Group told FACTORY.

"Results in manufacturing," he added, "and more lately the gratifying achievements in other areas such as Engineering and Administration, have us sold on the effectiveness of the Videosonics technique. We intend to vigorously apply it both internally within our area of the company and externally with our military customers. A liberal application of this technique can only result in a more effective organization."

The present Videosonics unit (the twentieth configuration) is, like most equipment, an evolution of prototypes. The A-V units used in other systems, of necessity, resemble the Hughes unit, but most do not have all its features.

The latest configuration, Videosonics Model 102-Blue, is a general purpose portable unit. It is equipped with the same controls and accessories as the bench-type model. Recesses with hinged panels are provided for tape and slide magazines to protect against damage during transport. In addition, its projector is capable of throwing pictures on a larger,

... the question is: Do workers learn or don't they?

external screen as well as the built-in screen. This projection versatility may be included in a bench-type unit on special order.

The Key Is Planning: A precise programming method has been developed at Hughes to provide illustrations and instructions that give maximum information. The "scenario" is programmed by a staff composed of industrial engineers, foreman, quality control supervisor and a bench-operator. They literally take a specific operation apart—examine each segment—and select the subject matter for photographs and outline the tape-script. This brings the photographer and writer into the staff.

Next, the bench-operator performs a "dress-rehearsal" of her work under the supervision of the the foreman. The scenario staff directs the photographer to take shots of specific major operations. Where needed, and especially in a photo that includes a number of operations, numbered plastic arrows and ribbons are used to key each step to the taped instructions, direct the operator's eyes to the indicated point.

Utilizing the story-board technique, the slides are examined critically to make certain that they clearly delineate each operation; that there are no superfluous slides. The writer, who has been working along with the staff, completes the script, sequencing it with the slides. The narrator then takes the script and, while viewing the projected slides on a screen, cuts the tape.

The same critical interest in producing efficient slides is used in the production of sound-tapes. Obviously it is necessary to put the message over forcefully and in a pleasant manner. The narrator is therefore required to ennunciate clearly, carefully consider his word-pacing, provide emphasis, and change his inflection with the proper sections of the text.

The writer, in collaboration with the staff, uses short sentences dealing precisely with a single instruction. This "instruction in bits" also obviates even the slightest need to tax the operator's memory; reduces fatigue from this source to a minimum. Moreover, writers select words that may be most clearly understood. They avoid homonyms.

Industry Not Only Customer: The individual in military service, as well as in industry, is confronted with the problem of assimilating, retaining, and applying a perpetually increasing amount of complex information. In addition to internal plant use, Hughes' Ground Systems Group (Fullerton, Calif.) have applied Videosonics to military training and operational problems.

Heretofore, the military, like industry, has conveyed intelligence through written word or verbal instructions. Because of the increasing complexities of electronic equipment and weapons' controls, this conventional method of instruction is becoming as archaic as the muzzle loading rfle. The urgent need for better instruction and training methods is accentuated by the turn-over of servicemen.

What About Human Factor? With very few exceptions, A-V systems have been enthusiastically received. The primary reason for this acceptance, revealed by a recent Nortronics' study, appears to be that the unit reduces the job to a non-decision making, mechanical process.

Nortronics, and others using A-V, report operators rely solely on A-V pictures and instructions as a guide for their work, seem to have increased assurance of doing the job right. Relieved of the chance of misinterpreting text or drawings, and the stress incurred by the responsibility of making decisions, operators experienced less fatigue.

The chief source of resentment, say FACTORY sources, occurs when a particularly skilled operator objects to the rote process the A-V unit places on him.

Conversely, most other operators have shown a marked appreciation for the "solitude" obtained by eliminating distracting sounds when using the earphones. Hughes assemblers seem to particularly enjoy the intervals between verbal instruction sequences when the taped voice is replaced by music—even seems to resent any interruptions. An automatic volume suppressor fades the music into the background when the operator again actuates the tape.

As yet, no serious employee problems have arisen from the potential boredom that a repetitive program might incur. The theory has been advanced that the musical intervals add diversity, increase interest in this work. And that it is possible the audio triggers the subconscious mind and compels the operator to complete its instructions. Too, the fact that operators tend to keep their earphones in place adds to their ability to concentrate.

Some build their own: Not all of the assembly instruction devices being used are off-the-shelf purchases. Here are two examples of companies that have worked out their own instruction systems to meet their particular needs.

• The Eclipse-Pioneer Division of Bendix Corporation, Teterboro, N. J., purchased commercially available tape recorders and 35 mm slide projectors. They mounted them (along with synchronizing equipment)

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on portable, wheeled cabinets. One channel of the tape contains verbal instruction, while the other has 60 cycle electrical impulses at prescribed intervals. These activate the slide indexing mechanism, making the unit fully automatic.

However, Bendix points out that the assembler has full control over each system (which they've named Vid-E-Aural) just as in the more complicated designs. With his foot pedal control, an assembler may stop the instructions at any time or, by rewinding the tape, he may hear again any instruction he desires. Clarity of instruction gets maximum emphasis at Bendix. The script is not written merely so it can be understood, but so that it *cannot be misunderstood.*

• The Magnavox Company, Ft. Wayne, Ind., uses a continuous-loop, operator-monitored tape recorder and colored slides, but augments these with flip charts and models where needed. Five seconds before a new tape instruction is given, a tone signal is sounded. The operator may stop the tape at that time if he has not completed the operation, or if there is some interruption, such as a dropped tool. When ready, he depresses a foot pedal and the tape again reads out. Unlike the Bendix unit, however, the Magnavox tape is *not* reversible.

The synchronizing tone is on the same sound track as the instructions, but at a high frequency above the audible range. If the assembler is using color-coded flip charts rather than slides, the tape cues him when it is time to turn to a new chart.

Testing and inspection are two obvious areas that lend themselves to A-V instruction. The entire sequence of many complicated procedures can be related on film and tape. Even such fleeting and elusive images as the proper pattern on an oscilloscope screen can be readily taught via A-V aids.

A-V systems have eliminated the need for close scrutiny, coaching and guidance by instructors, required for complicated tasks. The impact of voice and pictures augments the human memory process; extends the individual's capacity. And it does this with greater accuracy because it repeats necessary detailed instructions, time after time, without error.

There is some disagreement on the amount of learning involved with the new A-V machines. Bendix teaches inexperienced assemblers, puts them on their own after Vid-E-Aural has helped them master the necessary operations.

But Magnavox feels differently: "It is interesting to note that operators do not truly learn from the device. One veteran operator assembled over 60 complex assemblies with its aid, then found herself unable to assemble more without using the system. This condition is roughly analagous to the secretary who takes dictation from a machine, then finds herself unable to remember what she has typed."

Recording the magnetic tapes (top) requires careful planning to make certain the instructions *cannot* be misinterpreted. In use, (center) audio-visual assembly instruction equipment relieves operator of decision-making, thereby increasing effectiveness, lowering fatigue. Other applications, such as typing complicated office forms (bottom) are speeded by A-V instruction.

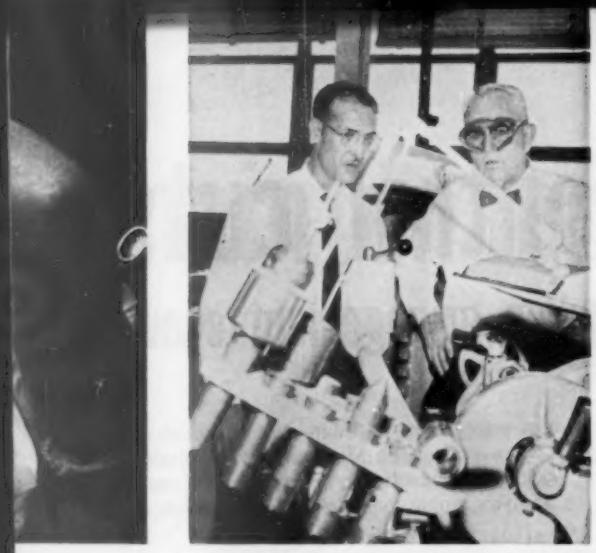
A plant manager is the lifeblood of an operation. As such, he must stay in circulation—as Don Hartford does. His payoff: high morale, good productivity, consistent quality, controlled costs.

QUALITY CONTROL comes up for discussion with forelady in textile area. She also tells Hartford of crew's low absenteeism and high safety record, husband's new car.

DESIGN PROBLEMS of conveyor system absorb Hartford and engineer.

PRODUCTIVITY and Scouting talk get equal time with spinning operator.

SAFETY EQUIPMENT undergoes monthly check-up by supervisors as Hartford kibitzes. System helps to establish good housekeeping habits.



COST CONTROL, work loads, and safety are subjects important to maintenance supervisor.

MATERIAL HANDLING confab expands to include baseball.

WORKER MORALE gets a boost as Hartford invites draw-twist operator to share a vacation experience over coffee.

Manager's foot-work keeps plant on its toes

He uses person-to-person contact to improve plant operations and to keep production consistently high.

Martinsville, (Va.) is a small community, and duPont's nylon fibers plant is its principal employer. It's a good sized plant—over 800,000 sq. ft.—But plant manager Don Hartford circulates through at least part of it every day, on an informal, people-to-people program that yields practical cold cash results. Hartford knows that conscientious employees are his only insurance of high quality and low costs. His secret weapon: frequent personal contact with everyone in the plant—to prove that management knows everyone counts and everyone contributes.

In turn, employees know that they have a personal stake in the effectiveness of the operation. They know that their importance is recognized. That they're appreciated as individuals, both on and off the job.

Hartford is genuinely interested in every employee, his triumphs and his tragedies. But he's not paternalistic. He knows when and how to crack down. His popularity is a means, not an end. Each employee is working *with* him—not *for* him—toward realistic business goals.

A lot of his time is spent discussing plant operations with his backfield—the industrial engineers, maintenance manager, personnel director, manager of quality control, plant safety director, and the product improvement men. Hartford feels that there are several advantages in dropping by to see these men—rather than keeping himself in the inner sanctum with a heap of reports. First, when he gets the word from the horse's mouth, he's more liable to get it straight. And he's more liable to get all of it. Second, the men tend to think of him more as a consultant than as a policeman. They have a chance to develop, aided by his judgment and guidance. They exchange on-the-spot reactions. They share with him their problems and accomplishments. And he knows them at first hand.

Hartford's wanderlust really pays off. The Martinsville operations are stable, output is *uniformly* high in quality, and costs are under control. Morale is consistently high, communications between plant management and operating groups is effective. Community relations—no small item—are excellent. And, of course, Hartford himself is on top of everything that affects his plant. He can move fast to head off headaches, improve operations.

Moral: Stay on *your* feet to keep *your* plant on its toes.

Quality Control cuts

Craftsmen respond when management shows

Tearing a page from the manual of production tricks, managers at the Marietta, Ga., Division of Lockheed Aircraft Corporation have succeeded in applying quality spot-checking to maintenance work.

Results:

- Callbacks for maintenance corrections fell from 24% to 10% in 90 days. They're down to 3% now.
- Downtime is reduced, there's greater machine availability.
- Equipment and buildings are in better shape.
- Work areas are tidy when men finish work.

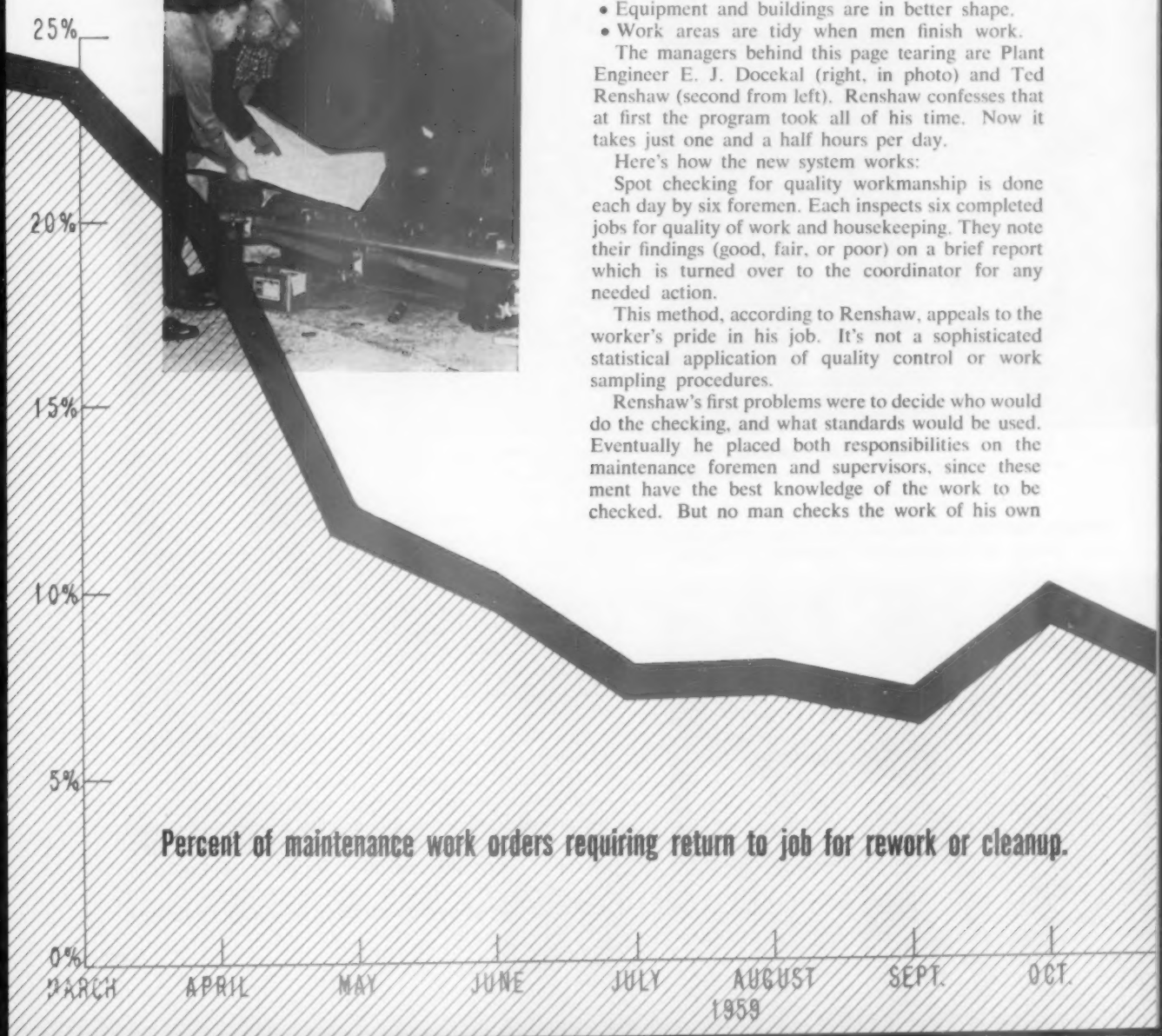
The managers behind this page tearing are Plant Engineer E. J. Docekal (right, in photo) and Ted Renshaw (second from left). Renshaw confesses that at first the program took all of his time. Now it takes just one and a half hours per day.

Here's how the new system works:

Spot checking for quality workmanship is done each day by six foremen. Each inspects six completed jobs for quality of work and housekeeping. They note their findings (good, fair, or poor) on a brief report which is turned over to the coordinator for any needed action.

This method, according to Renshaw, appeals to the worker's pride in his job. It's not a sophisticated statistical application of quality control or work sampling procedures.

Renshaw's first problems were to decide who would do the checking, and what standards would be used. Eventually he placed both responsibilities on the maintenance foremen and supervisors, since these ment have the best knowledge of the work to be checked. But no man checks the work of his own



Percent of maintenance work orders requiring return to job for rework or cleanup.

maintenance errors

clear-cut interest in their work

mechanics, unless it's unavoidable.

Spot-checking duties are rotated to a new group of six men every four weeks. They inspect only during the first four days of the week; the fifth day is for paper work and meetings. Each man inspects 24 jobs a week. The coordinator reviews 144 reports per week, from the six inspecting foremen.

The sampling covers a maintenance force of 400 hourly employees in five divisions—electrical, mechanical, utility, flight lines, and roads and grounds.

Random selection, by Renshaw, determines the jobs to be inspected. But he chooses only jobs that reveal some degree of quality performance. Replacing a light bulb, for example, would not qualify. In selecting jobs for inspection, Renshaw trys to keep a ratio of new jobs, preventive maintenance, and trouble jobs similar to the ratio of work orders for these jobs. The work orders for the six jobs chosen for each inspector are attached to a single blank inspection report. Thus, he gets a complete job history with a minimum of clerical work. The inspection report carries a horizontal data line for each of the six jobs to be inspected. Data for each job included: work order number, date, location and type of work, craft, and approval signature. The lower half of the report is blank, to be used for needed comments.

The inspector usually makes his checks all at one crack. He sends the completed report back to the coordinator the same day. The coordinator reviews all reports daily, and notes irregularities, such as "job still incomplete", or "work not satisfactory". He also has the responsibility of detecting other deficiencies, such as "too much time taken for job", or "job done on the wrong work order".

Job reports that signal needed correction are returned with the original work order and the report to the foreman of the job (not the inspecting foreman). He consults with the worker and gets the job rectified. The inspecting foreman then okays the report. It goes back to the coordinator, and he personally inspects and approves the correction.

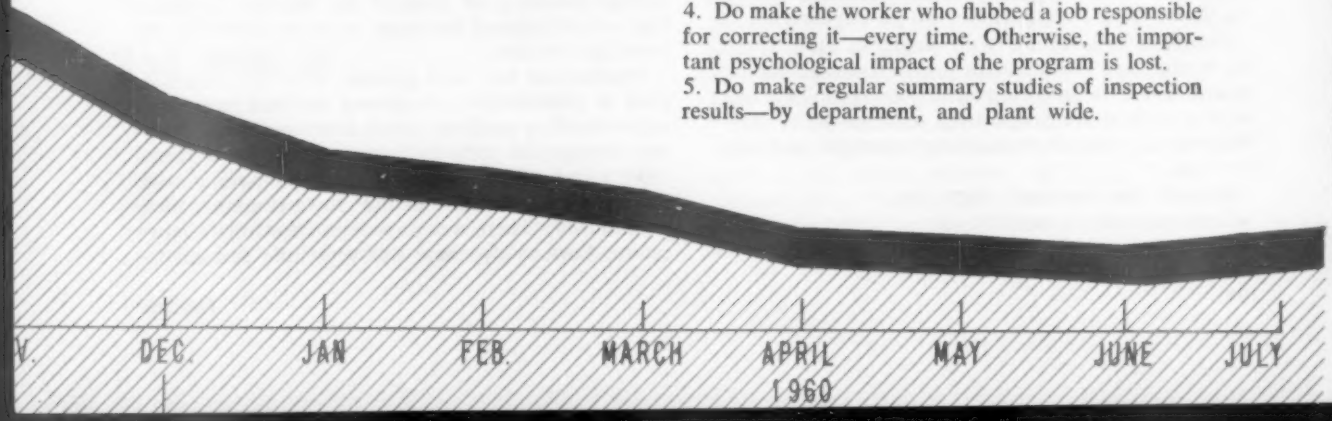
A few samples of the defects uncovered by this spot-checking program are these:

- Electrical work order: Repair bare wire leading from control box. Work reported: New wire pulled in and connected. Inspection report: Poor job, incomplete—cable not properly secured and cover not replaced on box.
- Mechanical work order: Lay out, cut concrete, and replace rails for gantry crane to be used at Lanly furnace. Work reported: Complete. Inspection report: Poor job, rails not level and not properly secured.
- Plant Utilities work order: Repair sump pump. Work reported: Complete. Inspection report: Poor job, pump still leaking and wiring to pump not properly secured.

Administrative reports, made weekly and monthly, tell the plant engineer and coordinator how well the spot check system improves maintenance work. The weekly report tells the number of spot checks in each department, type of work (new, PM, or trouble), and the quality scores. All inspection reports are attached in case a detailed examination is required. The monthly evaluation is made in graph form. Plant-wide and the departmental graphs are added to an annual graph (similar to the one presented below). "Without these graphs," says plant engineer Docekal, "you don't know where you stand; whether you're high or low. You should set a reference point early in your program, then check progress, and know whether your effort is paying off."

Four rules for application are these:

1. Don't rush into a program of this type. It's an unfamiliar idea to many maintenance men, and they're only human if they resent the idea at first.
2. Do let the men know why the spot checks are being made—that the idea is to upgrade maintenance performance generally, not single out individuals.
3. Do follow up inspections within two days. Otherwise, the reports lose all their punch.
4. Do make the worker who flubbed a job responsible for correcting it—every time. Otherwise, the important psychological impact of the program is lost.
5. Do make regular summary studies of inspection results—by department, and plant wide.



Searching for ◊ THEY for

Cost-cutting "co-op" members: (left to right) P. S. Gittings, E. S. Haven, W. H. Grinold and W. H. Ashwell (kneeling). Haven is a Behr-Manning product engineer. Others are Wallingford executives. (Operator: E. Kasprzycki).
Photo: Mallinson's Studio

It was 1952 when the purposeful men above started looking for ways to trim the cost of finishing stainless steel strip.

They did succeed in cutting costs, and in the process have helped Wallingford (Conn.) Steel Company capture a big share of the new $30,000-a-ton market for paper-thin stainless aircraft skin.

One key to their cost-improvement success is the wide-belt grinder being operated in the photo. Grinding in a flood of oil, it removes the crown that has added weight to stainless strip and limited aircraft design. It also cuts costs on less glamorous jobs, like grinding strip for camera parts and flatware.

Wallingford management discovered just last year that reduction of 0.001-in. in the thickness of stainless steel skin can add up to 90 passengers to an airliner's payload. (The actual weight of eliminated metal is equivalent to that of only nine men, but lower skin weight reduces engine, wingspan, fuel and structural needs.) The 9-passenger advantage is multiplied by 10, thus adding 90 passengers to the payload.

But these facts weren't in the picture in 1952. Then, the Wallingford improvement program was prompted by ordinary cost, quality, and delivery problems like those that face every operating manager every day. Wallingford managers wanted improvements, and they got them.

Overall, they cut costs 60% by:

- *Reducing labor costs 75%*
- *Increasing output capacity 28%*
- *Cutting lead time from four weeks to 10 days or less*
- *Reducing scrap waste*
- *Tightening stainless strip tolerances (to plus or minus 2½% of gage).*

FOR A BEVY OF PROBLEMS

Finishing operations on stainless steel strip were responsible for a large share of the cost-quality-delivery problems. Improvement effort was concentrated in this area. Here's why.

After rolling, stainless strip has variations in thickness along its width and length, and tapers down at either side of the strip. This is the result of thermal action and roll wear in the hot roll operation. The center has a crown, which may amount to .002 inches over average edge thickness. Neither variations nor the crown can be removed completely by additional rolling. Grinding off some of the thickness variation has been recognized for many years as the only really workable solution.

Wallingford had been grinding strip for some uses such as critical-tolerance camera and gun parts, with older, dry-type machines (stock for blanking and forming some camera parts has a tolerance of plus or minus .00015 in.). If the edges of the strip were outside tolerance limits because of the crown condition, they were slit off. There was no way to effectively remove crown. Fortunately, there was very little demand for

cost reduction, this team found an extra dividend . . .

smooth the way tomorrow's jetliners

wide precision strip, so the inability to remove crown only made scrap loss high.

It was this waste, and other cost factors, that led strip finishing Superintendent William H. Ashwell to start a campaign for cost improvement.

One concern was that the grinding equipment required an average of three passes per side to remove variations. Ashwell and Industrial Engineering Manager Philip S. Gittings also were concerned about grinding belt costs. With a maximum shift production of two coils, four to five belts were being used up. Both men felt this could be improved.

Operations Vice President William H. Grinold had the problem of lead time at the top of his list. In any highly competitive business, the company that can deliver a special product first is often the one to get the order. Grinold wanted lead time trimmed from the four-week average. One bottleneck was the grinding operation, with an average backlog of 55 man-hours.

The three managers turned to Behr-Manning Company for help. As a leader in the abrasives field, Behr-Manning had the research facilities, the engineering skills, and the grinding know-how to make a strong contribution. Other Wallingford operations men were also added to the problem-solving team.

A UNIQUE SOLUTION . . .

That was 1952. Today, Wallingford has a wide-belt finishing line that's a first in the industry. It cost nearly $300-thousand. But it will save $91-thousand per year in material losses alone. It uses one abrasive belt where the older machine used four or five. It grinds for 7.5 cents per linear foot instead of 17.5 cents per foot. And it has created a new product—crownless stainless steel strip.

A NEW GRINDING LINE

The new grinding line is made up of two 60-hp vertical grinders running in tandem, each driving 30 x 126-in. resin bonded cloth belts, with aluminum oxide or silicon carbide abrasives. Unlike earlier dry grinding equipment at Wallingford, these belts grind in a flood of sulfur-chlorinated oil pumped to each grinding head at 65 gallons per minute (maximum capacity of the system is 100 gallons) from a 4,000-gallon reservoir and filtration system. Grinders were made by Hill-Acme (Cleveland).

In working to tight tolerances, Wallingford now rolls its stock, grinds, then rolls again. The initial rolling procedure is to reduce the stock to appropriate working gage. Then the grinding operation corrects for gage variation, and removes the crown. A final rolling operation produces the desired finish.

The grinding operation receives close attention because there are many variables including:

- As much information as possible is given the operator before he begins grinding. Methods engineers give him data on each coil, to help him know what to do with it. They tell the amount of crown, the irregularity of the gage, the alloy, and hardness.
- Most grinding is done in the soft condition.
- For most jobs, an 80-grit aluminum oxide belt is used for corrective grinding.
- Belt speed for the 30-inch belt is normally 2100 fpm, but may be operated at 4200 fpm.
- Line speed for the coil is normally about 6 fpm now. But this is expected to be raised to as much as 36 fpm, as more experience with the machine is gained.

Several novel features combine to flatten the strip as it approaches the abrasive belt: The coil is under endwise tension of 30,000 lbs., and it is sharply bent, at angles up to 20 degrees, by being forced under "break" rolls as it approaches and leaves the grinding point. Also, a solid steel billy roll or work-support roll eight inches in diameter forces the strip against the belt by hydraulic pressure. With such heavy components, the machines can handle strip to 0.240 inches in thickness.

Contact rolls are knurled steel or serrated rubber. An X-ray gage automatically traversed across the strip records thickness on a moving reel of paper. The huge filtration system delivers collected swarf to a self-dumping hopper on the finishing room floor. Precipitrons extract oil vapor from the exhaust system. A spot welder attaches lead strips to the leading end of each coil. Integral power hoists with canvas slings handle changes of the heavy contact rolls. Circuitry is fail-safe throughout; belt breakage or lowered oil level shut off all power instantly and apply brakes to rotating parts. And finally, a fire extinguisher system has its discharge nozzles focused on grinding heads and filter tanks.

LOGIC:

Key to faster trouble shooting

"ELECTRICAL TROUBLE shooting's no problem at my plant. Joe can put his finger on the trouble spot in any circuit just like that. He does it by the seat of his pants—a sort of sixth sense."

If that's the way you feel you're probably dead wrong. A maintenance man with a midas touch for spotting trouble? There just is no such animal.

All too often hot-shot trouble shooters don't use *any* system—let alone the "halving" method. Halving means going to the midpoint of the circuit when looking for the faulty stage. In that way you eliminate the largest number of possibilities where a breakdown could occur. For example, if there are 100 stages where a breakdown is possible, you can eliminate half by checking in the middle. If the circuit is sound at the 50th stage you know that the breakdown must be in the latter 50 stages. If it is faulty, the problem is in the former 49 stages. You continue to half in the same fashion until the trouble spot is located.

If the circuit has branches instead of a straight line you modify the halving system by checking the spots next to, but not at the junction point where you eliminate the maximum number of possibilities.

Repairmen with a reputation for swift diagnosis rarely apply the halving principle, according to tests conducted by G. G. Corder of Kodak, Ltd., Harrow, England, based on studies by H. C. A. Dale, Cambridge University. They displayed many weaknesses in logical thinking, and could have solved the problem faster by a more systematic approach.

The company tested 30 technicians and engineers for trouble-shooting speed, and found the following errors prevalent:

1. Failure to use the halving system.
2. Checking at junctions in the circuit. This is unlikely to add to the subject's knowledge about which branch to explore.
3. Overlooking the fundamental objectives of eliminating the largest portion of the circuit with each move.
4. Repeating checks, indicating a total lack of a system.

On the whole, the engineers and those on the higher intelligence level, as indicated by their job responsibilities, received highest scores. Mechanical dexterity counted for very little.

TROUBLE SHOOTING CAN BE TAUGHT

Since some three quarters of repair costs in electrical breakdowns are spent in locating the trouble, it behooves any plant manager to cut down trouble-shooting time. And it's not just a matter of finding an experienced man to do the job. Diagnosis can be taught.

Kodak teaches its men on a transparent panel constructed with 144 holes. Each hole has an opaque covering. A line drawing representing an electrical circuit is placed in back of the panel. One of three symbols is lined up under each disc along the circuit. The symbols tell the testee whether the circuit is clear (x) or faulty (v) at that point, and if that spot is the trouble source (vv).

For test purposes there is only one faulty stage.

The tests are first given in a laboratory situation with the entire group deciding on the trouble-shooting moves. Then a critique is held with an instructor pointing out the best moves—under the halving system. Later, individual sessions are held.

Results: A noticeable change in the mental attitude of trouble shooters. Logic has replaced the old hit and miss system.

Typical way trouble shooters work. Starts from the rear instead of middle. Little or no system.

Correct way of solving the problem. Each move eliminates the greatest number of possibilities.

MORE!

FAIL PROOF system that slashes down time due to faulty lubrication, to next to nothing. Secret: Pinpoint lubrication scheduling carried out by trained men with the right equipment. ..... p. 206

ROBOT BRAIN may be no threat to the job security of anyone at your plant. But try and convince your workers of this. It's not easy. Here, then, is a six month plan to convince. ..... p. 161

PIPE BODYGUARDS—These polyethylene caps protect end threads during production operations. .. p. 218

DOZENS OF COST CUTTING ideas are included in these new catalogs. ..... p. 228

SOPHISTICATED CITY SEWAGE DISPOSAL system can be adapted to small plant use. ..... p. 108

WORK SIMPLIFICATION program can turn red ink into profit. This film tells how. ..... p. 250

HOW MUCH CONTROL have you? Can you fire a man for his off duty activities? ..... p. 184

BOOT-LICKING supervisors cut no ice with the men they're trying to impress. ..... p. 198

COMPUTER GUIDE—You can't tell the computers without this scorecard. ..... p. 178

PRODUCTION PROGNOSIS—Here's what's ahead for U. S. production in the next 15 years. ..... p. 244

EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

Low-cost automatic tape control for small shops

So you think you're too small for an automated machine tool. Then this numerical control system should change your mind. Hydra-Point automates your metal-working operation for $9000 by eliminating costly electronic components. It's the first such system to use pneumatic and hydraulic positioning.

And it's actuated by punched tape (left photo), dial console or manually. After manual placement of workpiece (center), hydraulic pistons position it for precision machining (right). Absence of electronic parts means longer wear, simple servicing, no lead-screw error. *Moog Servocontrols, Inc.* (Circle 88).

89—Portable Carton Sealer dispenses low-cost glue in even coat to any size area. It seals more securely than gummed labels or staples. And it makes neat package that doesn't catch onto anything during transit. Permits use of ungummed labels. Self-contained, weighs 3½ lb. *Ever-Seal Industrial Glues, Inc.*

90—Thickness Gage measures any non-magnetic coating on magnetic (iron, steel) base with maximum error of 10% (+0.0004). Responds with click that can be heard and felt. Differences in touch do not affect reading. Ranges: 0 to 20 mils for lacquers, enamels; 0 to 2 mils for platings, galvanizing. *Nordson Corp.*

91—Sling Chain has ring in linkage that elongates when overloaded. Warns visually of possible damage to sling. Ring can be replaced early and quickly by plant maintenance man. In most cases damage is to ring, so repair costs are kept to minimum. Made of steel alloy, in all types. *Campbell Chain Co.*

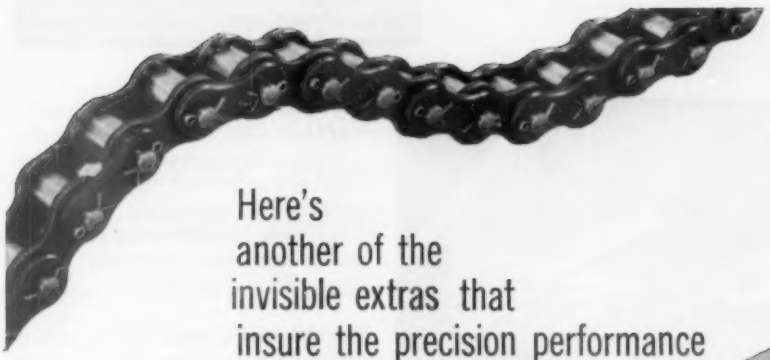
92—Screwdriving Machine, tailor-made with single or multiple spindles, offers positive jam-free air feeding of screws, studs, rivets, pins to 2¼ in. long. Single hopper feed. Adjustable for center distances. *Clyde Engineering & Mfg. Corp.*

93—Spot Heater, with quartz tube element, can be controlled by percentage timer or thermostat. Heats personnel, equipment directly under its rays. Two models: 36 and 60 in. long, 1000 to 4000 watts, 120 to 240 v. *Seaboard Products Corp.*

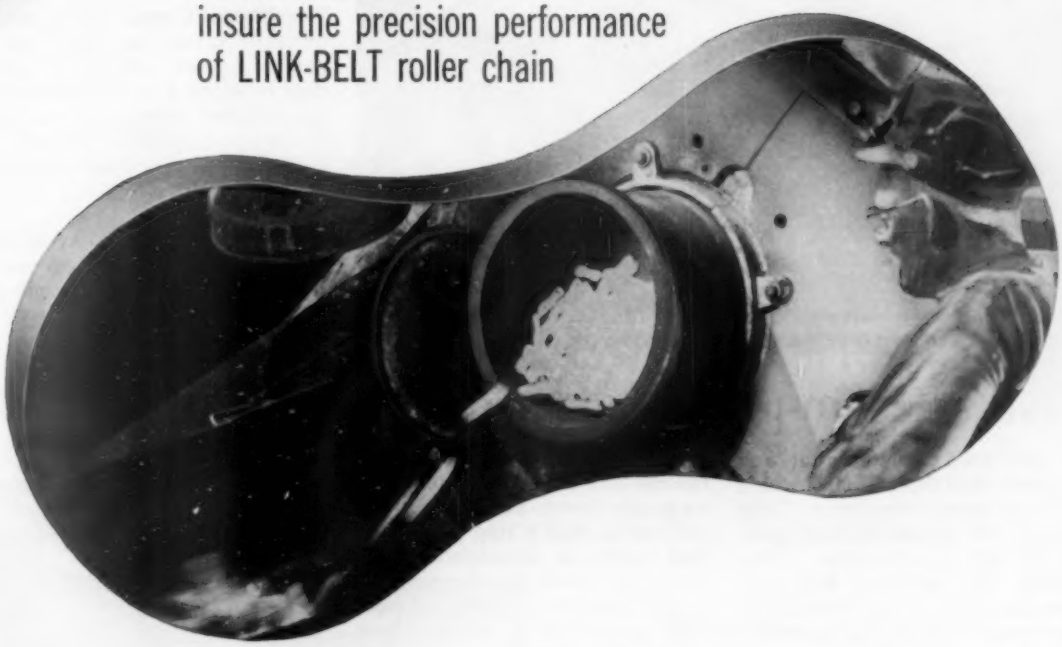
94—Nickel-Cadmium Battery is suitable for locations where dependable service is needed despite long periods of disuse. Keeps high discharge rate. In 22 sizes, with 8-hr. capacity, 10 to 450 amp.-hr. range. *Electric Storage Battery Co.*

95—Pillow Block offers high quality at low cost. Has pressed steel housing and self-aligning bearings. For use in moderate speeds and radial loads, and light thrust loads. Comes for ½ to 1 7/16 in. shaft sizes. *Fafnir Bearing Co.*

Turn the page



Here's another of the invisible extras that insure the precision performance of LINK-BELT roller chain

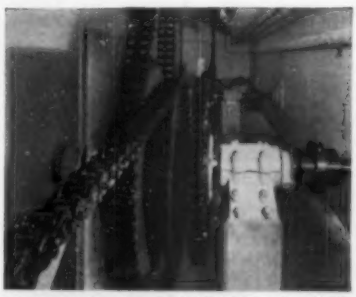


Painstaking precision of heat-treat control gives you

uniform strength in every link

To produce roller chain of utmost uniformity, Link-Belt maintains exacting control of all heat-treating processes. With equipment and instrumentation exactly tailored to the need, all processes are carefully adjusted to suit the characteristics of each heat and analysis of steel. Result: roller chain of uniform strength *well above accepted standards*. Chain that absorbs shock loads, delivers full power under continuous heavy going.

Precise heat-treat control is one of many *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include prestressing, pitch-hole preparation, shot-peening. These features—plus painstaking precision and inspection in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high speeds.



Single and double strand Link-Belt roller chains combine to provide dependable, positive power transmission at this installation.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. Ask for Book 2657.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,554

LINK-BELT

ROLLER CHAINS AND SPROCKETS

For more facts Circle 426 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

IMPROVEMENTS IN POWER-AND-FREE CONVEYOR GIVE

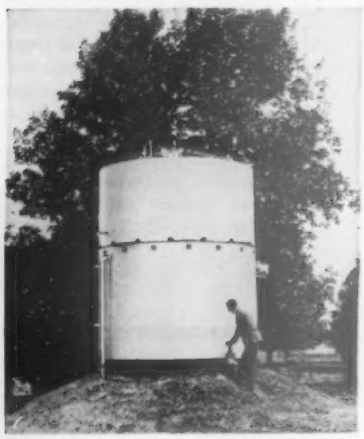
Fast, safe pin-point deliveries

Do you need more control and selectivity than that available with a simple power-and-free system? Then consider this smooth-working combination of six accessories. They promote this standard R-K 228 conveyor system to the "extra-ordinary" class. Components fit onto the free portion of the system.

- Gravity flow retarder prevents "run-away" carriers and impacts.
- Multiple station selector diverts loads automatically to stations.
- Automatic feeder sets in motion trolleys that have been accumulated on gravity storage line.
- Indexing trolley stop holds back load trolleys in accumulation area, then ejects them one at a time.
- Automatic tongue switch, a hinged track section, diverts carriers from power to free line.
- Vertical drop section allows section of free track to fall vertically for processing at given station.

Rapistan-Keystone, Inc. (Circle 96).

"Big city" sewage treatment on plant scale



If you're part of the drift from cities to suburbs, sewage disposal becomes a major problem. It's now solved with low-cost Bio-Pac. Here's a scaled-down, two-stage sewage processing plant that rivals big city ones for efficiency.

It conforms to health department standards and is useful where cesspools and septic tanks are restricted. Compact, it comes in factory-assembled package for 50 to 200 people. Larger units, for 250 to 500, come in sub-assemblies for fast field erection singly or in multiples. Easy to maintain. Operates on 1.5 to 20 kw. *Link Belt Co.* (Circle 97).

98—Time Switch turns equipment "on" one week, "off" the next to give it "rest." For use with two sets of motors, pumps, etc., that are to be worked on alternating schedules. Single-pole, double-throw type; dial makes complete revolution in 14 days. *Tork Time Controls, Inc.*

99—Electric Counter comes in hermetically sealed, non-reset case to give maximum protection against dust, humidity, bacteria, and tampering. Has four or five digits and operates at speeds to 600 counts per min. For front- or back-panel mounting. *General Controls Co.*

100—Pressure Gage Accessories protect against damage from pulsating pressures or corrosive chemicals. Diaphragm separates fluid from measuring element. Non-freezing liquid in space above diaphragm transmits measured pressure to gage. *American Machine & Metals, Inc.*

101—Tote Boxes, of glass fiber, come in unlimited sizes and shapes. Custom-made; suitable for small volume users. Can be made with hand-holes, wooden runners with rivet washers, and vent holes as shown. Wall thicknesses from 1/16 to 3/16 in. *Molded Fiber Glass Tray Co.*

102—Flange Seal, for most types of ASA flanges, will not blow out. Reusable, it can be replaced without scraping or extra cleaning of flange surface. Metal-to-metal contact eliminates need to re-tighten bolts. For −65 to +275 F., 150 to 2500 lb. *Parker Seal Co.*

Turn the page

"But Crusher, everyone knows the **CLARK SHOCK ABSORBER DOOR** *can take it!*"

Won't rip, warp or come off the fastenings

The Bumper takes the Shock— Not the Door

Not just an improved Impact Door—but a totally different concept! The Shock Absorber Door keeps traffic moving without slow-downs or bottlenecks. No costly "time-outs" for repair.

Flexibly suspended, this lightweight door opens and closes freely, either manually or when pushed by a truck. Exclusive Urethane-filled Bumpers absorb shocks that would *wreck* ordinary doors. Spring Retriever returns door unfailingly to closed position. Neoprene sealing at all edges assures tight, draft-free closure. Keeps wanted air IN—unwanted air OUT.

Surprisingly low in cost, the Shock Absorber Door comes in one complete, easy-to-install unit. Needs virtually no maintenance. Proven in the plant. Learn why so many Blue Chip companies, after ordering one door, are now reordering several more. See our insert in Sweet's Catalog, or, better still, write us today for full information.

CLARK DOOR COMPANY, INC. *(since 1878)*

504 Hunterdon St. Newark 8, N. J.

For more about these items, circle numbers on Reader Service Card next to back cover.

103—Fire Detector uses electronic tube sensitive to ultraviolet radiation. For flame-out applications; provides nearly instantaneous alarm. Will not react to direct sunlight, or most standard illumination. Ambient range: −75 to +400F. *Thomas A. Edison Industries.*

104—Guide Light projects sharp shadow lines, squares, rectangles or single white line to guide cutting, marking, assembly operations. Powerful 1500-watt, ⅜-in. bulb lasts about 2000 hr. with no loss in efficiency. Comes with special reflector. *Carter Products Co.*

105—Swinging Doors are rubber covered to withstand impact of fork-lift trucks passing through. Core is tough, light, non-warping glass fiber. Soft rubber around edges makes closure draft-tight, split-proof. Has shatterproof windows. *American Hard Rubber Co.*

106—Personal Radiation Alarm crackles violently when person is in area of radiation as low as 3 mR/hr. Clicks in presence of lower levels. Pocket-sized, Sparrow operates a week on pair of penlight batteries. Detects radiation to 3000 R/hr. *Gelman Instrument Co.*

107—Mobile Sewer Pipe Cleaner removes grease, rust, roots, scale, rags, other foreign matter from 3- to 6-in. lines up to 165-ft. long. Features on-off automatic feed, 2 lightweight quick-change cartridges. Electrically powered; one-man operated. *Marco Products Co.*

108—Straddle-Trailer Truck backs over palletized load (up to 40,000 lb.), picks it up, holds it while traveling, then unloads it. One-man operated—hydraulic lifting mechanism controlled by driver. Saves loading, unloading time, equipment costs. *Challenge-Cook Bros.*

Turn the page

ASARCO

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SHREVEPORT 29483
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Meier Brass & Aluminum Co.
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FE 8-4846
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Associated Bearings Co.
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Perth Amboy
Gregg's Brass Foundry
HILLCREST 2-2086
NEW YORK
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STERLING 8-1144
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RIVERSIDE 1520
RIVERSIDE 2020
Rochester
Ontario Metal Supply, Inc.
HAMILTON 6-1630
Syracuse
Meloon Bronze Foundry, Inc.
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Troy
The Troy Belting & Supply Co., Inc.
AS 2-4920 (in Albany 3-6121)
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Akron Welding and Spring Co.
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Reliable Castings Corp.
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J. M. Tull Metal & Supply Co., Inc
CEDAR 3-8366
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Memphis Bearing & Supply Co.
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Nashville
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CHAPEL 2-7351
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TERMINAL 3-2641
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CAPITOL 56531
Port Arthur
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For more facts Circle 428 on Reader Service Card ➤

Order bearing bronze in any lengths up to 105", diameters up to 9"

ASARCON 773 (SAE 660)
CONTINUOUS—CAST BRONZE

Asarcon 773 can cut your replacement bearing costs many ways. Buying only the lengths you need means no short-end scrap. Your choice of diameters up to 9" reduces diameter loss—only 1/32" to 3/32" to machine off. Every Asarcon bar is unconditionally guaranteed to be free of blow holes, pits, or sand inclusions. No shrinks; no hard or soft spots. Better, more uniform properties. Order Asarcon 773 from stock in 260 sizes, solids, and tubes, from a national network of distributors. Write for address of nearest stock point, and complete data, to Continuous-Cast Department, American Smelting and Refining Company, Barber, N. J. or Whiting, Ind.

ASARCO

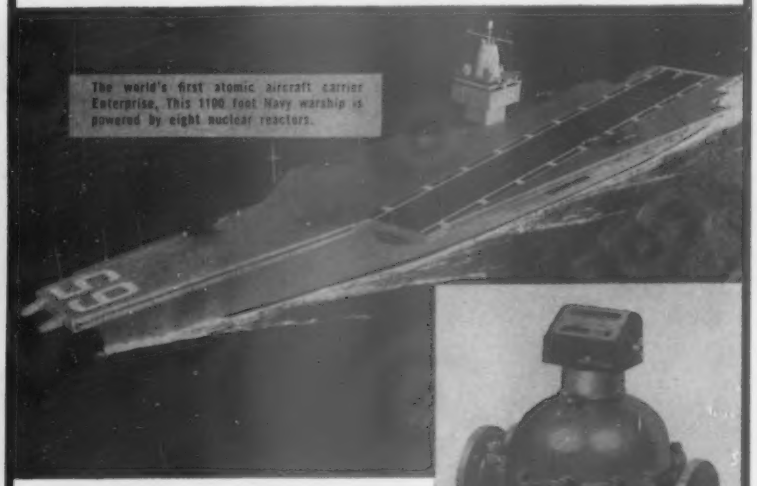
AMERICAN SMELTING AND REFINING COMPANY

CONTINUOUS CAST DEPARTMENT

West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

NIAGARA METERS

Meet the Exacting Requirements of Nuclear-Powered Ships



STANDARD NIAGARA METERS MEASURE DEMINERALIZED COOLING WATER WITHOUT DANGER OF CONTAMINATION

To reduce radioactive contamination in U.S. nuclear-powered ships, the cooling water for the nuclear reactor is demineralized. After demineralizing, the pure water must be measured. The meter selected for this operation must not recontaminate the water and make it a potential carrier of radioactivity.

Niagara Chemical Meters with stainless steel casings were selected. These are standard meters, the same as offered to the chemical industry for metering corrosive liquids. They met the critical Navy requirements without change, to meter and maintain the purity of the cooling water.

The complete line of Niagara Meters is described and illustrated in Bulletin 43. Send for your free copy.

Niagara Stainless Steel Meter. The same as used on the Enterprise. Used industrially for accurately measuring corrosive liquids.

Niagara Electricontact Meter. Brings automation to liquid measuring. Controls, activates, signals. Reduces costs.

Niagara High Pressure Meter. Extra heavy, for measuring liquids at high pressure.

BUFFALO METER COMPANY
INCORPORATED
Subsidiary of American Meter Company, Inc.
2887 Main Street • • Buffalo 14, New York

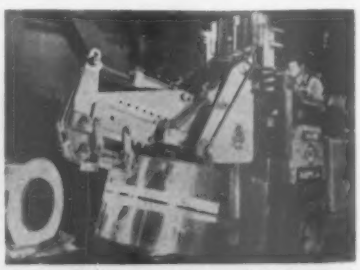
FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

109—Storage Battery, for stationary use, packs over 66% more power than other batteries of equal size. Uses tubular plates said to last 20 years in float-charge service. Reduces cost of amp.-hr. per year. Takes little floor space. *Electric Storage Battery Co.*

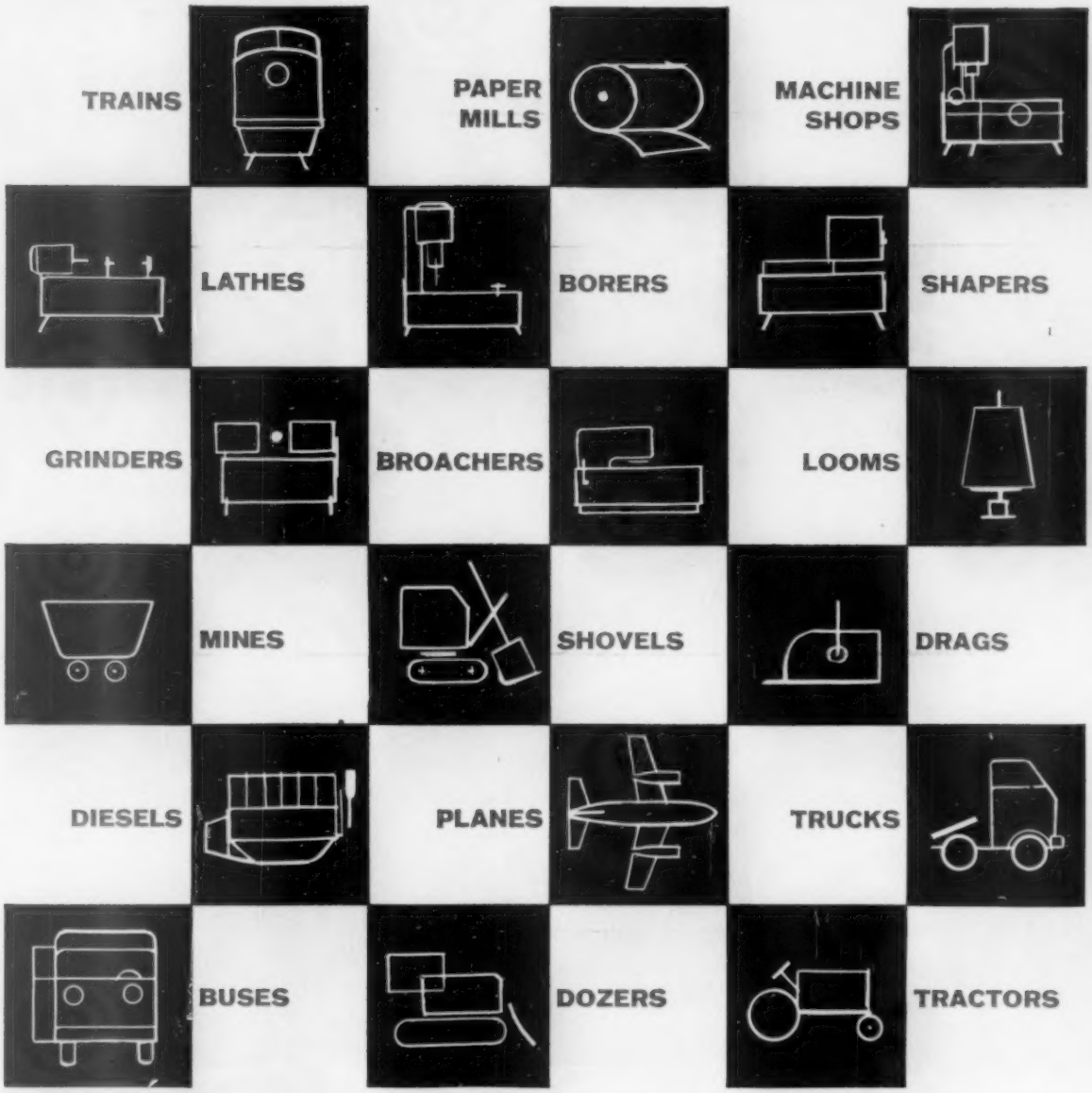
110—Dust Filter, reverse-air type, uses highly efficient cloth felt as filtering material. Made of either wool, Dacron or Orlon fibers, depending on application. Air jets automatically clean excessive dust from felt without shut-down or by-passing. *Koppers Co.*



111—Coil Handling Attachment, for fork truck, grabs coiled metal stock weighing up to 6000 lb., lifts and turns it from horizontal to vertical position in one operation. Adapts to any standard truck. Clamps adjust to any size, curvature. *Grand Specialties Co.*

Turn the page

If you manage or operate any of these...



. . . your best move is to Sinclair's specialized greases, oils and lubricants, to cut costs, speed operations and increase profits. There are more than 500 of these money-savers, and each does its particular job particularly well. For helpful information based on actual experience, call your Sinclair Representative or write

Sinclair

SINCLAIR REFINING COMPANY
Technical Service Division
600 Fifth Avenue, New York 20, N. Y. • CI 6-3600

For more facts Circle 430 on Reader Service Card

if you're using screws that drill and tap their own holes . . .

you should be using APEX sockets designed to drive them!

Apex—the authority on fastening—has created an entirely new type of socket to drive self-drilling, self-tapping screws. Specifically designed and built of special materials to withstand shock and strain, these new Apex sockets eliminate the unusual socket wear and breakage that frequently occurs in this type of service.

The sockets are magnetic, of course, to hold the screw firmly in position from start to finish of the driving operation. And, with Apex sockets, you aren't limited to a single shank type—you can select an Apex extension with a shank built to fit the exact make of power tool you're using right now!

Write today, on your company letterhead please, for complete details on the new Apex MIA08 socket for driving self-drilling, self-tapping screws. And for complete information on all Apex sockets, ¼" to ⅜" hex or square drive, just ask for Catalog 30-A.

APEX FASTENING TOOLS

SCREWDRIVING • NUT RUNNING • SPECIAL

The APEX Machine & Tool Co. • 1025 So. Patterson Blvd. • Dayton 3, Ohio

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

112—File-A-Tab Packets and boards stick permanently or temporarily to any surface to provide point-of-use holder for data processing cards. Can be relocated many times. Made of aluminum; two models for horizontal or vertical card filing. *Visual Controls Co.*

113—Conversion Kit adds maintenance-free silicon rectifier to existing electrostatic precipitators at third of price for new mechanical power pack. Adapts to a-c connections, d-c switchgear. Replaces electronic tube-type rectifiers. *Buell Engineering Co.*

114—Vacuum Lift opens plastic or multi-wall paper bags 30 to 60 per min. stacked to 6 in. Speeds opening of bags to be filled on production line, or handling of separately stacked products. Mounts on workbench, table. Powered by 110 v., 60-cycle motor. *Maran Mfg. Co.*

Turn the page

"I screamed for pump service and they sent me a salesman!"

"Every important man in the plant is raising cane with me and the manufacturer sends out a *salesman* to fix my pump! I don't want sympathy . . . I want service. I want a man who knows pumps and *fixes pumps for a living.* I need him badly . . . RIGHT NOW!"

• • •

Trained service . . . one of the inherent qualities you get when you buy Allis-Chalmers pumps. Industrial Equipment Division, **Allis-Chalmers,** *Milwaukee 1, Wisconsin.*

A-1314

ALLIS-CHALMERS GIVES TRAINED SERVICE

At Allis-Chalmers, the servicemen "service" and the salesmen sell. Factory-trained men are available in every regional office to service pumps "on the spot." Certified service shops can rebuild equipment quickly . . . save you transportation expense and time. When you call A-C for service, you get service . . . from servicemen. The quickest and best offered by any pump manufacturer.

LOUISIANA /where climate is a lot more than "weather"

You'll find weather everywhere, but *Industrial Climate* is another matter. Investigate Louisiana's excellent *Climate* for business and industry, both large and small, established or projected. Get the facts on Louisiana's *ample, top-stability labor force* that gives a good day's work for a day's pay ... our *forests* and *fertile farmland* ... industrial sites offering up to *several billions of gallons of fresh water per hour* ... deepwater, river and Intracoastal shipping. And remember Louisiana's big oil and gas, salt and sulphur reserves ... pipelines and electric power transmission systems that deliver energy where it's needed. Most important of all, however,

are the *people* of Louisiana. In every phase of the state's *Industrial Climate*, it has been the people who supplied the initiative. They encouraged creation of the Louisiana Department of Commerce and Industry in 1936 and backed its pioneering 10-year ad valorem industrial tax exemption. You will like them — they speak your language, and they didn't learn it yesterday. Yes, *Climate* means much more than "Weather" in Louisiana. It is a *conviction*, a *frame of mind* that is producing the brightest new look on the industrial scene.

Every section of Louisiana has: SIZABLE COMMERICAL CENTER / ABUNDANT FRESH WATER / ACCREDITED UNIVERSITY OR COLLEGES / TRADE SCHOOLS (Louisiana will train the labor you need) / GOOD RAIL, AIR, HIGHWAY TRANSPORTATION / LOW COST ELECTRIC POWER, NATURAL GAS AND PETROLEUM PRODUCTS

A greatly varied range of businesses and industries enjoy Louisiana's favorable "Industrial Climate" NOW.

Complete information on request from:

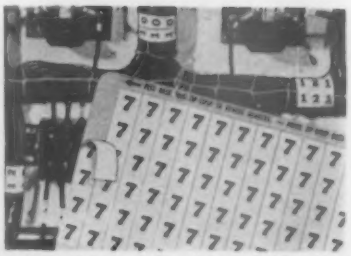
LOUISIANA DEPARTMENT OF COMMERCE & INDUSTRY
CAPITOL STATION • BATON ROUGE 4

For more facts Circle 433 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 108

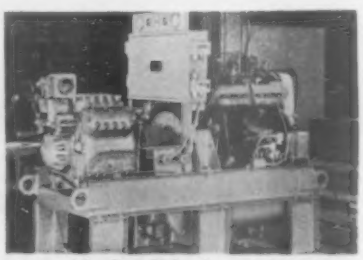
For more about these items, circle item numbers on Reader Service Card next to back cover.



115—Cable Markers stick on cables, power supply lines, and heavy-duty wiring harnesses for easy identification. Made of "stretchable" vinyl plastic, markers keep groups of wires in neat bundle. Stamped with numbers 0 to 9 or letters A to F. *W. H. Brady Co.*

116—Mobile Ultrasonic Cleaner can be used with solvents, detergents, mild acids, alkaline solutions. Self-contained, drains through flexible hose—no plumbing connections. Tank, counter top of stainless steel. Plugs into 115 v. outlet. *National Ultrasonic Corp.*

117—Recorder-Controller has two pens that record two variables on single round chart. Accurate within ±¼%. Uses potentiometric or bridge-type circuit. Swing-out panel exposes plug-in components for servicing. Minimum scale span: 1 mv. d-c. *General Electric Co.*



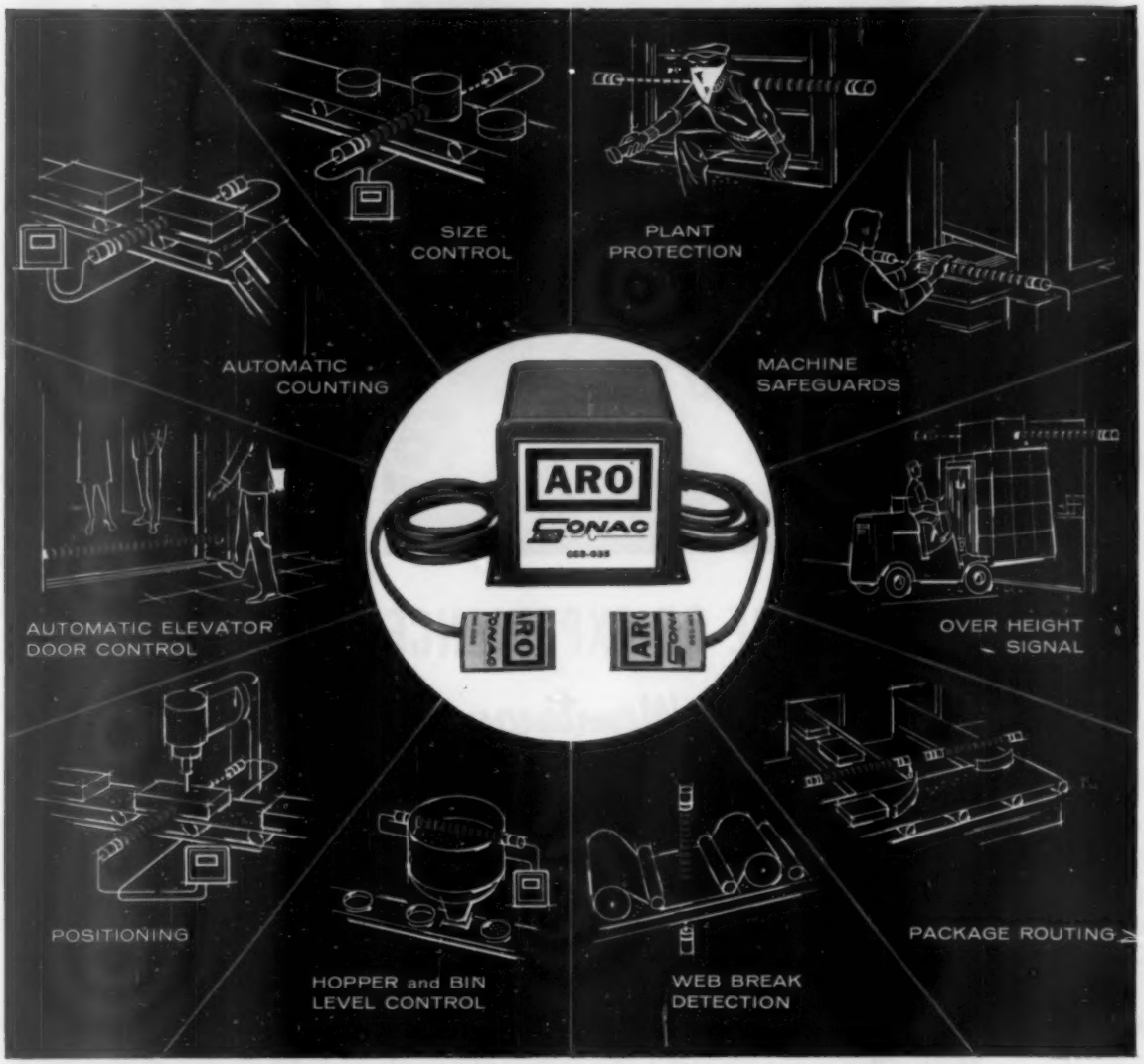
118—Air Conditioning and refrigeration units have motors that run on natural gas. This low-cost fuel cuts down vibration—results in less noise. Refrigeration capacities: 7½ to 150 tons. Compressor adapts to load variations from 1800 to 1200 rpm. *Bell & Gossett Co.*

Turn the page

This is SONAC

PATENTS PENDING

New Ultrasonic Automatic Control By ARO



Sonac's beam of ultrasonic sound waves will sense, count, control or monitor under conditions that foil other sensing and switching devices. Sonac doesn't need to see . . . requires no light of any kind . . . will work in contaminated atmosphere, darkness, and can even be piped through flexible hose or tubing. Sonac is unaffected by industrial vibration. Fully transistorized amplifier and hermetically sealed sensor construction require no maintenance. Easy to install. For complete information on Aro's new Sonac Ultrasonic Control, call, wire or write Aro today.

ARO®

THE ARO EQUIPMENT CORPORATION
Bryan, Ohio

Aro of California, 3141 S. Grand Ave., Los Angeles 7, Calif.
Aro Equipment of Canada Ltd., Rexdale (Toronto), Ontario
Offices in All Principal Cities

For more facts Circle 434 on Reader Service Card

THE IMPORTANCE OF EXPERIENCE

in Matters of Maintenance

Over 30 years of diversified experience in solving the varied preventative maintenance problems of industry has developed scientific abilities for Wilbur & Williams which can be invaluable to you. Surfaces that once were doomed to costly corrosive deterioration can now be throughly and quickly protected with Wilbur & Williams Specialized "Protectioneered" Maintenance Coatings.

Necessitated by problem corrosion — Envisioned through experience — Formulated through research — Proven through actual performance . . . We will be pleased to tell you more about Wilbur & Williams products in terms of your own maintenance problems.

RE-3 THE THREE-POINT product for re-roofing with a brush . . .

REFLECTS HEAT & COLD—INSULATES ROOFS AND SIDING

RENEWS ROOF—PREVENTS LEAKS

RECOLORS & BEAUTIFIES

Another MINIMUM — INTERRUPTION MAINTENANCE Product from . . .

THE WILBUR & WILLIAMS CO., INC.

Factory and General Offices, 651 Pleasant St., Norwood, Mass.

In Canada, WILBUR & WILLIAMS, 7920 16th Ave., Ville St. Michel, Montreal 38, P. Q.

For more facts Circle 435 on Reader Service Card

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

119—Machine Mount effectively isolates horizontal shock and vibration. Handles to 4000-lb. static load. Comes with internal neoprene springs available in various stiffnesses to suit forces and frequencies. Measures about 10¼x8x1½ in. *Barry Wright Corp.*

120—Electronic Relay actuates any electrically controlled function of process or machine such as size, position, liquid level, flame control. Needs 50 ma. to activate; responds in 0.02 sec. Actuated by most methods of grounding external probe. *Clark Controller Co.*

121—Portable Air-Tool Oiler mounts in any hose line with ¼- or ⅛-in. P.T. connections for about 8 hr. of use with 1-oz. reservoir. It is made of lightweight aluminum. Produces fine mist, and needs no adjustments. Lubricates in any position. *Wilkerson Corp.*

Turn the page

CUT INITIAL COST AS MUCH AS 40¢ PER SQ FT

It's easy with the most powerful fluorescent you can buy! If you're planning a new building . . . or remodeling an existing one . . . you can shave your initial lighting investment by as much as 40¢ a square foot.

How? Specify G-E Power Groove* Lamps. They give you more light than any other lamp. You use fewer lamps, fewer fixtures, fewer everything else it takes to light your building properly. And your savings keep mounting. With fewer lamps, fixtures and ballasts, your maintenance bills will be lower, too.

The secret's in the grooves. They're what bend the arc stream (it's straight in other fluorescents) . . . lengthen it . . . make the lamp put out more light. Only G-E Power Groove Lamps have 'em. Only General Electric gives you this years-ahead light source—another example of a difference that makes a difference in value to you. Call your G-E Lamp distributor next time *you* need lamps. General Electric Company, Large Lamp Dept. C-031, Nela Park, Cleveland 12, O.

*General Electric's trademark for configurated fluorescent lamps

Progress Is Our Most Important Product

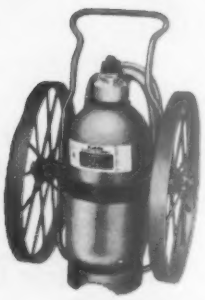
GENERAL ELECTRIC

For more facts Circle 436 on Reader Service Card

NOW! GET FULL-POWER FIRE FIGHTING WITH KIDDE'S DRY CHEMICAL LINE!

2½ and 5 pound pressurized units! Granted top rating by U.L., these two units pack the extra punch needed to get the jump on fire. For example, the 2½ pound Kidde unit is as compact as a 1 quart carbon tet model, yet is eight times as powerful! Both the 2½ and 5 feature simple, two-step operation, easy-to-read dust-and-moisture-proof gauges. 10 pound dry chemical also available.

20 and 30 pound pressurized dry chemicals! Both these Kidde units have the same good features of the 2½ and 5, plus some "extras" all their own. Center balanced for fast action, rugged diffuser horn, speedy trigger operation, recessed pressure gauge and enclosed mechanism.



200 pound dry chemical wheeled unit! Kidde's 200 pounder discharges a 40-foot stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. Low center of gravity and wide wheels make it easy to maneuver. Easy-to-use discharge control makes operation simple.

400 pound stationary unit! Here's maximum protection in a minimum package! Like all Kidde units, this features sure, dependable performance and fast, easy operation. Either wall-mounted or free standing, leakproof and tamper-proof, exclusive Bridgeman Seal, universal long-range nozzle, easy-to-read pressure gauge. 200 pound model also available.

Get the jump on oil, gas and electrical fires! Learn more about the complete line of dependable, efficient Kidde equipment—write today!

Industrial and Marine Division
Walter Kidde & Company, Inc.
1132 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

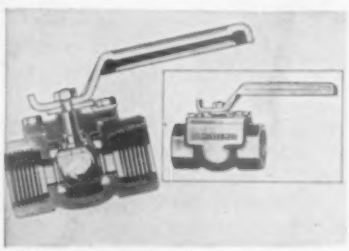
Kidde

FACTORY/EQUIPMENT NEWS

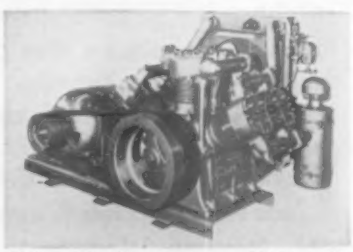
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

122—High-Velocity Nozzle, with individual controls for air and water, speeds cleaning, flushing and drying jobs. Can be used to deliver air or water alone, or combination of both at choice of pressure. Fits water or air hose connections. *Molded Specialties, Inc.*



123—Ball Valve is easily serviced with tool on handle. Self-aligning ball (flat on top and bottom) rides on Teflon or Buna-N seats, sealing at high or low pressure without springs or bearings. Bronze, it has screw ends, pipe sizes ¼ to 2 in. *Lunkenheimer Co.*



124—Air Compressor (100 psi.), in 25- to 100-hp. range, is compact, air-cooled unit. Features two-stage compression and intercooling between stages. Rugged, highly efficient, eliminates cooling water, hence no freeze-up or scale. Easy to service. *Clark Bros. Co.*

Turn to page 127

FULLER PNEUMATIC CONVEYING SYSTEMS INCREASE PRODUCTION, CUT CONTAMINATION FOR GOODYEAR

Recent installation of specially engineered Fuller Airveyor® pneumatic conveying systems to handle pelletized rubber has helped Goodyear Tire and Rubber Company increase production. These systems are the latest Fuller design resulting from over 15 years experience in pneumatic conveying of rubber pellets. These completely enclosed automatic systems virtually eliminate contamination problems and greatly reduce the chance of loss due to spoilage.

Automated handling of crude rubber with Fuller Pneumatic Conveying Systems, in place of conventional rubber slab sheeting on a mill, is the key. One Airveyor system conveys the pelletized rubber from the pelletizer to a weigh station, a distance of 500 feet. Four more systems operate from the sink dump scales to inlet spouts of the finish-run Banburys.

All of these Airveyor pneumatic conveyors are of the vacuum type, employing positive pressure exhausters for air supply. Each conveying system is equipped with its own individual bag-type filter, automatic in operation, which provides for 100% visible dust retention. Exhausters and filters are located on the roof. A control panel permits manual or automatic operation of the entire handling system.

If you are handling dry, bulk, granular materials, a Fuller Conveying System application-engineered to your process can be equally advantageous. Look to Fuller, whose range of products coupled with experienced know-how offers you the best *single source* for solving pneumatic materials handling problems. Just call or write Fuller today outlining your problem—no obligation, of course. A-288 1954

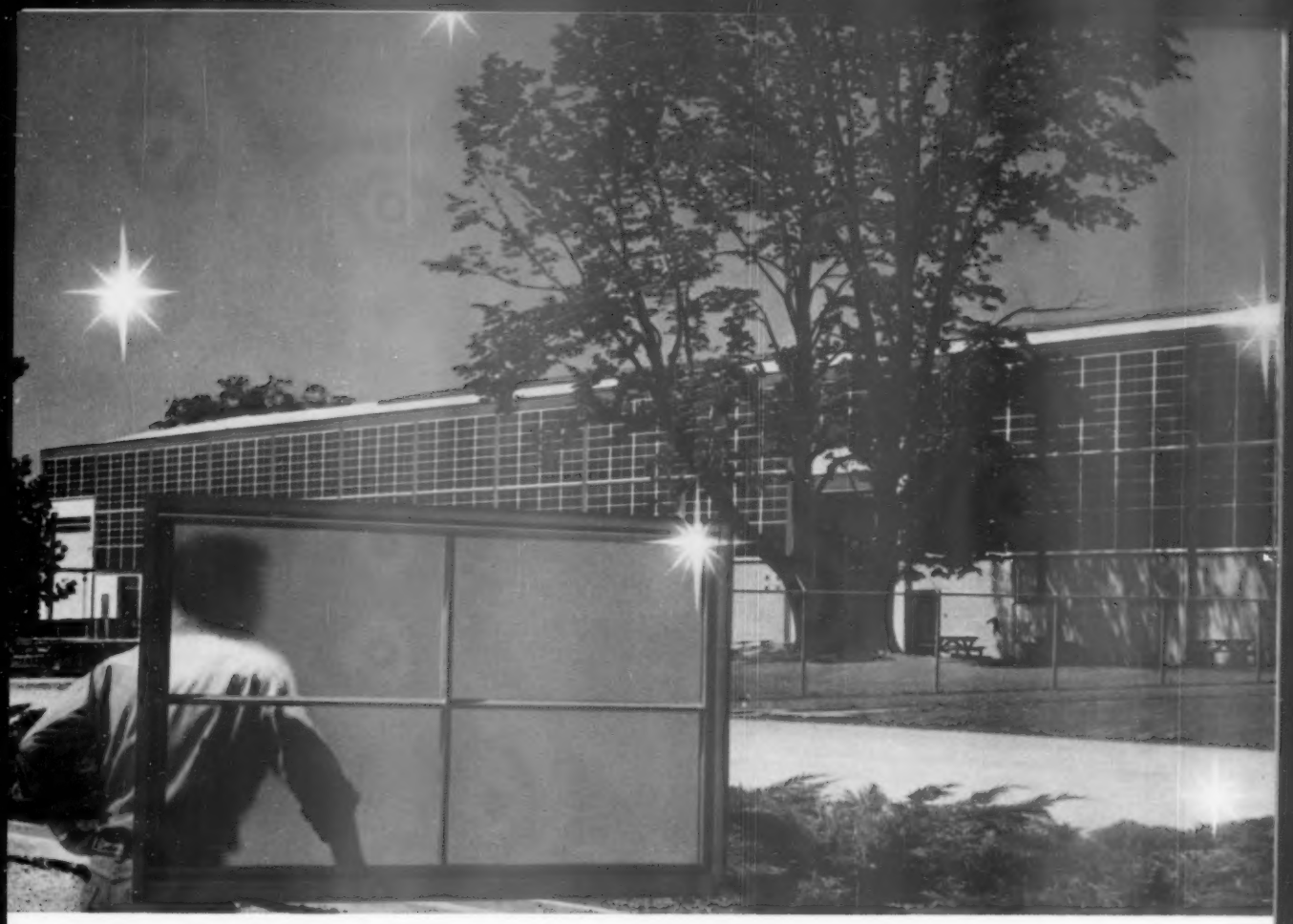
FULLER COMPANY GENERAL AMERICA TRADE MARK

FULLER COMPANY
188 Bridge St., Catasauqua, Pa.
Subsidiary of General American Transportation Corporation
Offices in Principal Cities Throughout the World

Fuller
....pioneers in harnessing AIR

For more facts circle 438 on Reader Service Card

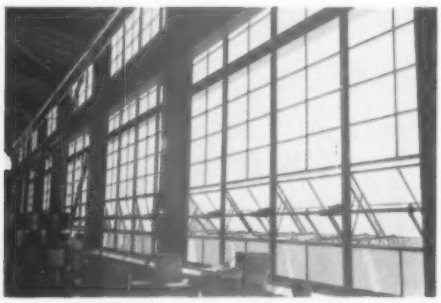
For more facts circle 439 on Reader Service Card →



Color comfort in light for Barber-Greene's new Ontario plant...through

GLASS BY AMERICAN-SAINT GOBAIN

Some creative solutions to problems of radiant energy control for the versatile A-SG line



John B. Parkin Associates specified one of eight varieties of AKLO heat absorbing glass – for the Barber-Greene plant, above. Lighting is generous, yet restful and free of glare. It's available wired or unwired . . . in ⅛ and ¼-inch thicknesses . . . with polished or patterned surfaces.

Reynolds Metals Company Building in Detroit, by Minoru Yamasaki, is notable for its finely-modulated daylighting—admitted through A-SG *LUSTRAGRAY*® covered by an aluminum sunscreen, and through faceted skylights of A-SG *HUEWHITE*®.

Vincent G. Kling's distinguished Operations Building for the Government Employees Insurance Company is glazed throughout with TOPAZ PLATE by A-SG. One of eight integrally-colored plate glasses . . . provides light balance, glare control, increased privacy.

When a heavy industry enters a small-town environment without clashes of character, an architectural triumph has been scored. This is the case with the new plant built by Barber-Greene Ltd. in Don Mills, Canada. Here complete processing plants and massive road-building equipment are manufactured. Yet the structure's quiet poise makes it a most welcome neighbor. The design, by John B. Parkin Associates, is notable for its 70-foot clear-span bays, and an abundance of controlled daylighting. To achieve the optimum in climate control, restful illumination and architectural color, the architects specified Blue Ridge Aklo* for both vertical glazing and skylights. This is another fine glass by American-Saint Gobain.

Glazing Contractor—Consolidated Glass Industries Ltd.

*Reg. T.M.—Lic. by Corning Glass Works

The installations and samples pictured here suggest the variety of ways in which American-Saint Gobain glasses can contribute to your plans. Every important type of flat glass—in the widest range of characteristics, sizes and designs—is available to you from this one source.

For detailed information, see the following Sweet's files: *Architectural:* 7a/Am . . . 16d/Am . . . 3e/Am. *Industrial Construction:* 6a/Am . . . 3b/Am. *Light Construction:* 2e/Am. *Plant Engineering:* 5b/Am.

For other information, call the A-SG office nearest you...or write:

AMERICAN-SAINT GOBAIN CORPORATION,
DEPT. F-60, 625 MADISON AVENUE
NEW YORK 22, N.Y.

CREATIVE IDEAS IN GLASS

A few of the hundreds of handsome and functional glasses sheet, rolled, and plate – from the advanced facilities of

AMERICAN-SAINT GOBAIN CORPORATION

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AMERICAN MONORAIL DOES IT!

20% SAVING IN LABOR

Lowering a partly assembled trailer top from an upright jig. Five hoists are used because some tops are made in 3 sections. This is a 44-ft. American Monorail crane. A 30-ft. crane and 150 feet of Monorail track also help speed production.

The following are direct statements made by an executive of Richardson Homes Corporation, world's 3rd largest mobile home builder at Elkhart, Indiana.

We chose the American Monorail System because they offered the best product at the least possible cost, plus the finest engineering service available.

"We have been able to realize a 20% cut in labor costs . . . The Monorail system eliminated 16 hard laboring jobs—4 in each of 4 departments.

"Production has increased at least 20% because of our Monorail and we have virtually eliminated backsprains and accidents that used to be prevalent."

AMERICAN MONORAIL

OVERHEAD HANDLING EQUIPMENT

ENGINEERED MATERIALS HANDLING

1114 EAST 200th STREET CLEVELAND 17, OHIO

MEMBER OF MATERIAL HANDLING INSTITUTE AND MONORAIL MANUFACTURERS ASSOCIATION

For more facts circle 440 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

125—Truckster, with dump hopper, can be used to pick up trash or haul loads to 800 lb. Costs little to run—delivers up to 50 mpg. of gas. A release catch dumps hopper by gravity. Powered by 8 hp., 4-cycle engine. Hydraulic brakes on all 3 wheels. *Cushman Motors.*

126—Portable Ground Detector spots leakage and grounds (from 0 resistance to 50,000 ohms.) in underground power systems. Shows in which phase fault occurs. Works on any 2- or 3-phase system from 105 to 480 v., without switching. Four test leads. *Opad Electric Co.*

127—Safety Hook, for cranes and hoists, has catch that locks at two points to prevent load from detaching itself. Capacities from ¼ to 30 tons. When full throat opening is needed, operator swings safety catch to one side. *Shepard Niles Crane & Hoist Corp.*

Turn the page

Packing costs tumble

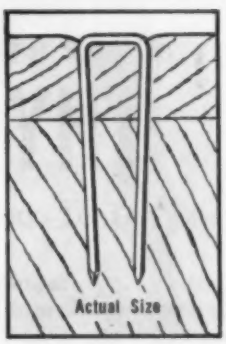
with high-speed *DUO-FAST* Staple Nailing

Here is an air-powered, lightweight gun that drives heavy duty 16 gauge staples, up to 1½" long, that outhold nails.

Because it is 4 times faster than hand nailing, the S-762 knocks down the cost of assembling crates, boxes, wood frames, expendable skids, and many other nailing jobs.

Example: Crating costs tumbled 80% for a store fixture manufacturer when they changed to DUO-FAST Staple Nailers.

But the S-762 DUO-FAST Staple Nailer is only one of a complete line of manual and air-operated tools. There is a DUO-FAST Stapler/Tacker/Nailer that is *precisely right* for your industrial fastening jobs.



SEND TODAY for DUO-FAST Manual FT-9. See for yourself the unequalled range of DUO-FAST equipment . . . and what it can do for you.

FASTENER CORPORATION, 3702-10 River Road, Franklin Park, Illinois

0597

DUO-FAST Staplers Tackers Staples

Everything you need for tacking, stapling and nailing.

For more facts Circle 441 on Reader Service Card

replace with **RCA**

THYRATRONS

in critical control low-power applications

It makes good profit sense to replace with the best...and the most dependable low-power thyratrons you can get come from your RCA Industrial Tube Distributor. RCA thyratrons have an unmatched record throughout industry for reliability and long life in the most demanding industrial control applications. You get top service for your tube dollar when you replace with RCA thyratrons.

Your local RCA Tube Distributor stocks the standard types of thyratrons for low-power applications—including the popular RCA-2050 and RCA-2D21. He's set up to give you immediate, off-the-shelf delivery. Call him for all your replacement tube needs.

RADIO CORPORATION OF AMERICA
Electron Tube Division Harrison, N.J.

FACTORY/EQUIPMENT NEWS

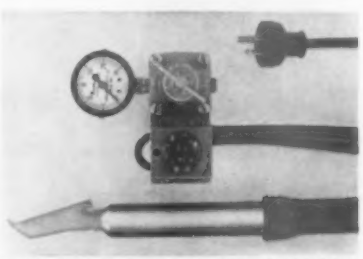
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

128—Disconnect Switch, for 750-v. operation, comes in 5000-amp. unit or multiples of 5000 amp. for gang-operated applications. In single- or double-throw (photo) design. Auxiliary blade, with arcing tip, closes first and opens last during operation. *H. K. Porter Co.*

129—Service Entrance Switch has pressure mechanism which "bolts" blades to contacts when handle is moved to closed position. Auxiliary springs maintain pressure when blades are open or closed. Capacities: 1200 to 2000 amp., 240 to 600 v. a-c. *Barkelew Electric Mfg. Co.*

130—Process Control System, for processes requiring multi-channel blending, uses standard digital computer not specially designed one. Delivers tallies and remembers true flow of all ingredients. Detects malfunction, compensates for it, or shuts down. *Bendix Corp.*



131—Thermoplastic Hand Welder and tacker handles polyethylene, polypropylene, PVC, and plasticized tank lining at speed of 60 in. per min. Has 3 heat positions with 800-watt output. Plugs into 115 v. a-c. Has air-cooled handle, 16-ft. hose. *Kamlar Products Co.*

Turn the page

Coming full gallop, his face hidden by a closed helmet, and amidst the noise and dust of the field — you could nevertheless *instantly identify* the man — by the marking emblazoned on his shield, on the coat over his armor, on his horsecloth and on his banner. Such highly useful, *individual* identification by heraldic markings began 6000 years ago — and exists today in forms as familiar as the American eagle.

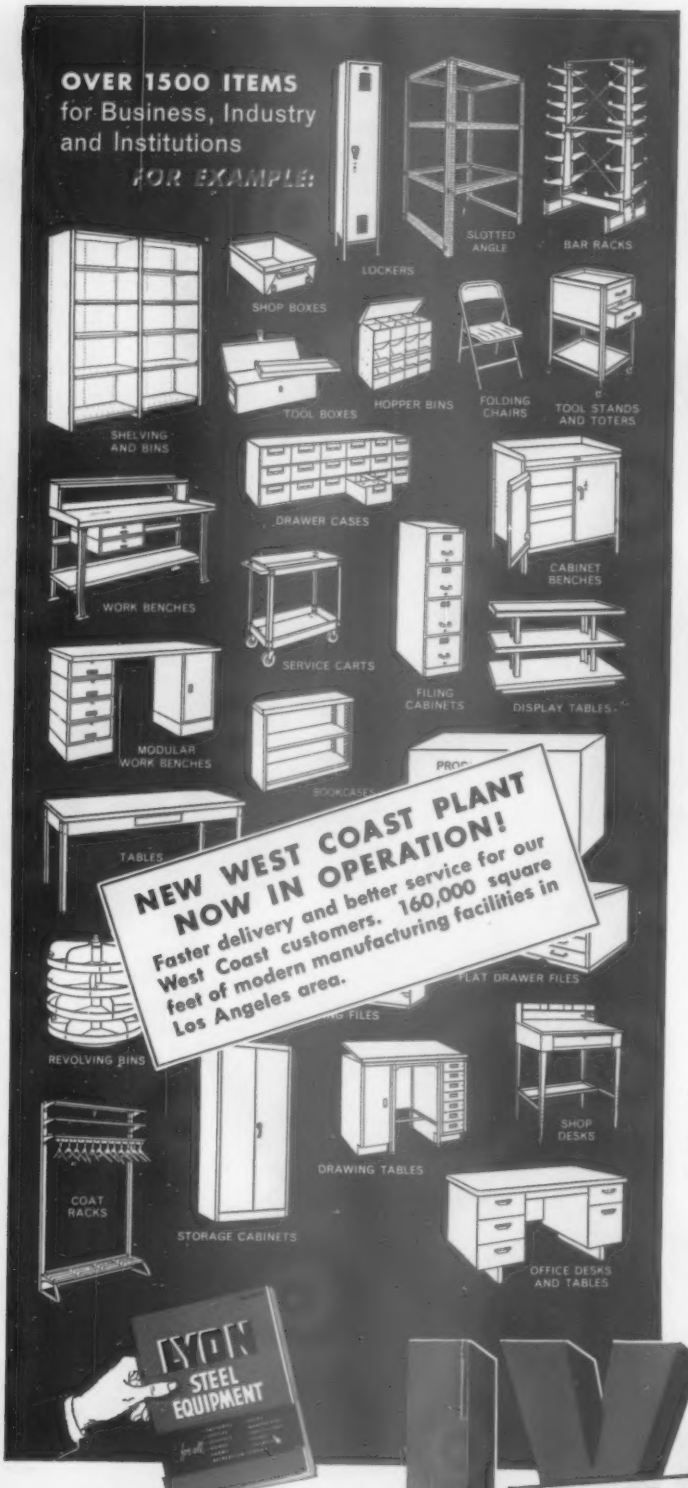
Aye-the mark of a clansman!

And for the product you make today, recognition by your customer of *what* it is is just as important as the shield was to the knight. And this quick and certain recognition or identification all hinges on how well your product speaks for itself — with a mark, label, or other identification which informs and perhaps decorates as well.

This is where we can probably help you — finding the one best and lowest cost way for your product to say what you want it to say — part number, size, use instructions, specifications, guarantee, reorder information, your trademark, etc. We don't have all the answers by any means, but we've helped supply practical methods using thousands of combinations of Markem machines, type and ink to identify all sorts of parts, products, and packages in all sizes, shapes and materials. If you'd like your product to speak for itself — completely, competently and economically — ask us if we can help you. Markem Machine Co., Keene 18, N. H.

MARKEM HELPING YOUR PRODUCT SPEAK FOR ITSELF

For more facts Circle 442 on Reader Service Card



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QUALITY PROTECTED LYON STEEL EQUIPMENT

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THE "QP" ON EVERY LYON CARTON IS YOUR ASSURANCE OF QUALITY EQUIPMENT

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THIS CATALOG ILLUSTRATES THE WORLD'S MOST DIVERSIFIED LINE OF STEEL EQUIPMENT *IT'S FREE!*

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FACTORY/EQUIPMENT NEWS

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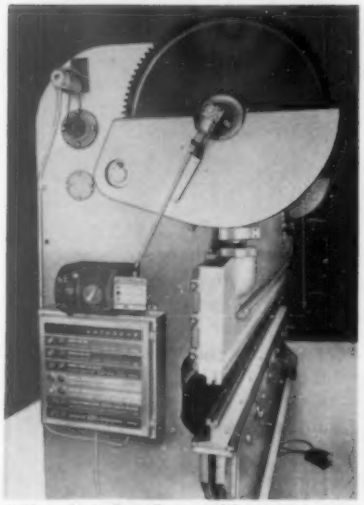


132—Autobend, pushbutton control, eliminates guesswork on press brake production runs. Automatically cycles brake, insures uniform bending at correct speed. Adapts to any press brake. Stepless controls permit peaking to maximum speed. *General Automation Corp.*

133—Maximum-Reading Meter has one pointer that remains fixed at maximum signal while variable pointer indicates continuing electrical signal. Maximum pointer may be set manually anywhere on dial. Also available in minimum-reading model. *Assembly Products Inc.*

134—Non-Electric Lift Table is air controlled for use in explosive locations. Air motor operates hydraulic lifting mechanism, and air valves permit stops along travel path. Relief valve prevents overtravel. Comes with filter and lubricator. *West Bend Equipment Corp.*

Turn the page

Low head room, single suspension hoist with motor driven trolley.

The PAY-OFF is PROFIT

with Shepard Niles JOB-MATED Hoists

Wasted overhead space in your plant is eating up profits! Make it pay off by installing an overhead traveling hoist to free valuable floor space and aisles for production or storage, cut handling costs, and increase overall plant efficiency.

To give long, economical service, the hoist must be matched to the job. At Shepard Niles, we specialize in providing **"Job-Mated"** hoists that have the ideal combination of capacity, clearance, speed and controls needed to match performance to precise job conditions. Custom built to your most exacting specifications.

Whatever your requirements, check first with Shepard Niles—you're sure to find the **right** hoist for the job among the thousands of types and sizes available.

To find out how Shepard Niles **"Job-Mated"** hoists will pay off in your material handling operation, send for a free descriptive bulletin, and ask to have a Shepard Niles representative call.

Balanced Drive Hoists from 250 lbs. to 20 tons

SHEPARD NILES
CRANE AND HOIST CORPORATION

3310 Schuyler Ave., Montour Falls, N.Y., U.S.A.

For more facts Circle 444 on Reader Service Card

Remove and install gears, bearings, wheels, pulleys, etc. quickly and easily with . . .

OTC HYDRAULIC "PUSH-PULLERS"

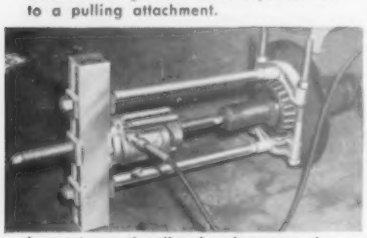
OTC hydraulic "push-puller" with attachment removes gear and bearing quickly and without damage. Push-puller (with legs threaded into a pulling attachment) is like a *portable* shop press.

Fifty-ton "push-puller" removing generator rotor assembly from shaft. Legs extend through the assembly, connect to a pulling attachment.

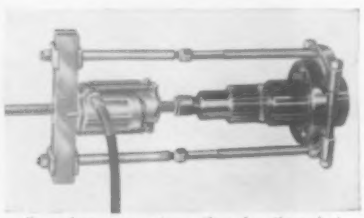
CUT MAINTENANCE COSTS AND MACHINE "DOWNTIME." SAVE PARTS!

OTC hydraulic "push-pullers" with attachments handle hundreds of tough, complicated pulling and installing jobs quickly, easily and without damage to parts.

Cut machine "downtime" and save parts by having the right tools in your shop to handle every job. Complete, versatile maintenance sets available in 17½, 30, 50 and 100-ton capacities. They pay for themselves in time saved



Large tapered roller bearing cone being removed by 50-ton OTC "push-puller" and attachment connected by threaded adapters.



Two leg connectors (female threaded adapters) join extra puller legs which thread into pulling attachment to pull a bearing.

Contact your OTC distributor for further information, or write for Industrial Maintenance Catalog, No. P-9.

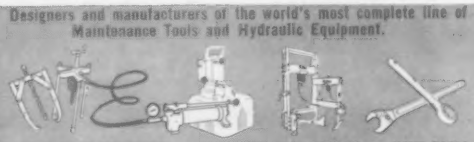
RESEARCH · ENGINEERING · DEVELOPMENT

OTC

OWATONNA TOOL COMPANY

399 CEDAR STREET OWATONNA, MINNESOTA

Designers and manufacturers of the world's most complete line of Maintenance Tools and Hydraulic Equipment.



PULLERS AND PULLER SETS · HYDRAULIC RAMS AND PUMPS · HYDRAULIC SHOP PRESSES · HAND TOOLS

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

135—Heat Exchanger absorbs heat from contaminated exhaust air and converts it to incoming cool air. Recovers over 80% of exhausted heat for big fuel saving. Fits into intake and exhaust of ventilation system. Eases refrigeration load. *Heat Recovery Corp.*

136—Fork Truck Attachment, with 3500-lb. capacity, permits palletless handling of bagged goods. Two hydraulically actuated scoop arms clamp bags. Arms spread to 67 in., clamp to 17 in. Side-shift mechanism speeds load pick-up and place-down. *Clark Equipment Co.*

137—Welding Gun and wire feeder, for use with Aircomatic welding process, are rugged. Can be operated continuously with minimum of downtime. Gun's goose-neck nozzle gets into hard-to-reach spots. Feeder handles up to 600 in. of wire per min. *Air Reduction Co.*

Turn the page

Illustrated is one of the six 12-cylinder Fairbanks Morse Instant Power Units (Generating Model 38 TD8 1/4) just installed at Thule, Greenland, key American defense base, to power the giant radar screens that warn of approaching missiles or aircraft.

This is the world's fastest-starting diesel generator–and the most economical

Advanced opposed-piston design — an exclusive Fairbanks Morse development — makes this Instant Power Unit the world's fastest, most economical standby!

Within 30 seconds, it hums to peak power! Full, vibrationless power! Automatically! Sturdy, self-contained, a complete generating package that delivers more kilowatts at less cost in less time than any other unit.

A model to meet every need. Automatic or manually controlled. Accessories to your specifications. Some are standard design—compact as your television set. Generate 5 kilowatts . . . safeguard homeowners in hurricane, blizzard, flood.

Others, huge as living rooms, are for utilities, industries and institutions. Produce 2500 kw at 900 rpm...can be linked to supply any volume of power for peaking, standby duty, dead-load pickup.

Inadequate power can disrupt your industry within a moment . . . strike at the health, safety, comfort of your home or community. No faster, better protection at any price than a Fairbanks Morse Instant Power Unit.

For full details or custom specifications, write today to: Mr. S. K. Howard, Director of Marketing, Diesel Products, Beloit Division, Fairbanks, Morse & Co., Beloit, Wisconsin.

Fairbanks, Morse

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

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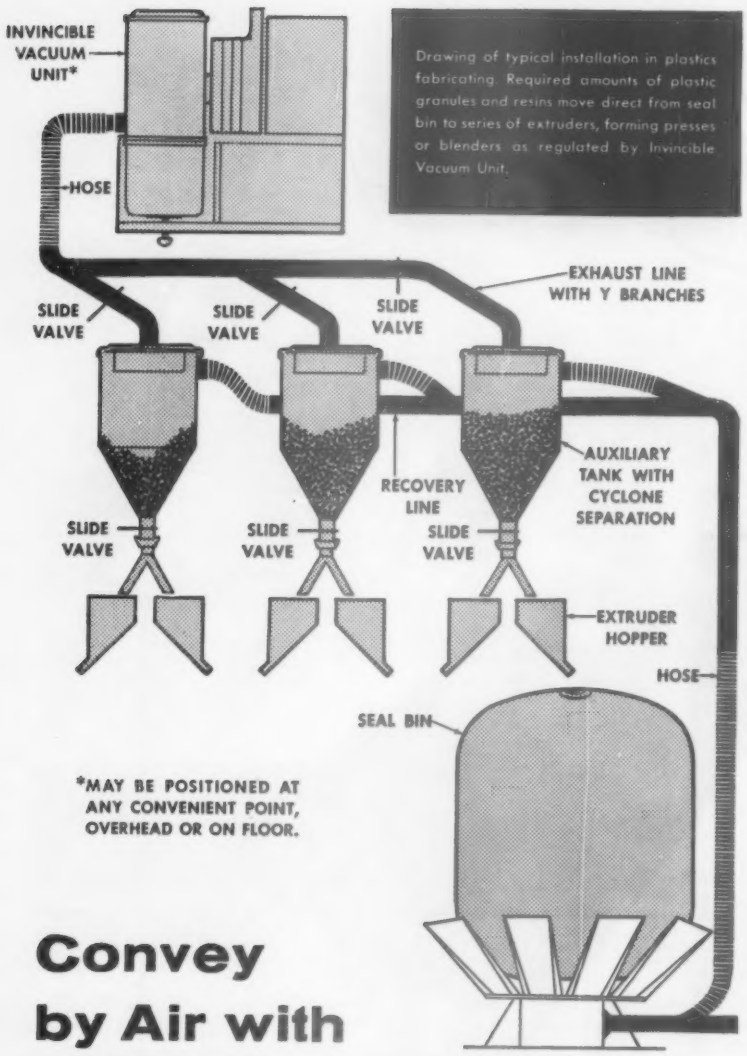


Drawing of typical installation in plastics fabricating. Required amounts of plastic granules and resins move direct from seal bin to series of extruders, forming presses or blenders as regulated by Invincible Vacuum Unit.

Convey by Air with INVINCIBLE

- **MAINTAIN PRODUCTION**—materials are where needed when needed.
- **REDUCE HANDLING COSTS**—eliminate manual unloading of containers.
- **PREVENT CONTAMINATION**—materials conveyed in completely closed system.

Learn how hundreds of materials conveying problems have been solved by Invincible industrial vacuum equipment... how reduction of rejects and savings in labor alone more than pay the cost of the average installation in a few months. Accurate free surveys on short notice available from resident engineers in all principal cities. *Write today.*

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

138—Portable Punch Riveter automatically punches hole, places rivet, and secures it in less than 2 sec. Handles all work impractical for stationary riveters. Weighs 50 lb. Finger trigger and hand grip are operating controls instead of pedal. *ACF Industries, Inc.*

139—Duct Furnace can be installed on downstream of cooling surface in air conditioning system. A built-in by-pass eliminates additional by-pass duct needed to handle high cfm. Six models with 75,000 to 300,000 Btu. per hr. input. Lightweight. *Modine Mfg. Co.*

140—"Tele-Tracer" Paging System uses miniature accumulator in receiver that's recharged by plugging into 110 v. outlet. Contacts 9 to 360 people from central station. Receiver lights or buzzes to alert person being paged. *Standard Research Consultants, Inc.*

Turn the page

For more facts Circle 447 on Reader Service Card

For more facts Circle 448 on Reader Service Card ➤

At Amana Refrigeration, Inc.

STANOIL

IMPROVES PRODUCTION
REDUCES MAINTENANCE

Smooths operation of 600 ton hydraulic press

Situation: The 600 ton Verson Press at Amana is a vital operating component in the manufacture of home freezers and refrigerators. Its proper performance is necessary to the efficiency of Amana's entire manufacturing operation. That's why erratic press operation, caused by foaming of the hydraulic oil, was a serious problem.

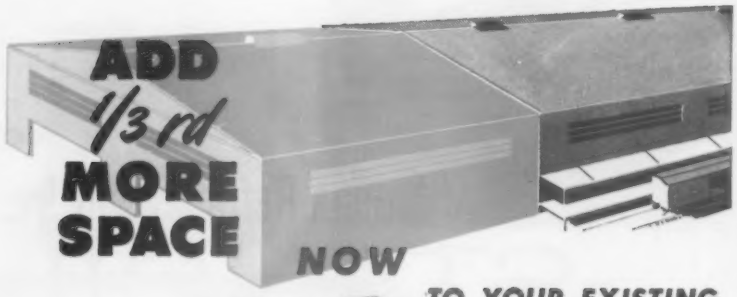
What was done? In seeking the solution to this problem, Amana consulted their Standard Oil lubrication specialist who recommended STANOIL for this service. STANOIL Industrial Oil is a top quality, first-line industrial lubricating and hydraulic oil. It will provide excellent service in many different applications. And when tested by Amana, STANOIL proved perfect for use.

What has happened? Since STANOIL was first put to work at Amana, it has performed for extended periods of time without foaming or oxidation, lengthening the time between drainings and improving press operation. As a result of this record, STANOIL has been adopted for use on other production equipment, together with Standard's RYKON Greases and SUPERLA Soluble Oil.

What you can do: To get help in solving your lubrication problems and to learn more about STANOIL Industrial Oils, simply call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Ill.**

You expect more from STANDARD and you get it!

Standard's Jess Nelson (center) and Gene Maske (left) checking lubrication survey with Leonard Rettig, Amana's plant maintenance superintendent. Jess, who is District Engineer for Standard, is a specialist in this kind of operation. He has an engineering degree from the University of Iowa, and has also graduated from the Standard Oil Sales Engineering School.



ADD 1/3rd MORE SPACE NOW

TO YOUR EXISTING STORAGE FACILITIES WITH THE

NEW RAYMOND® Reach-Fork®

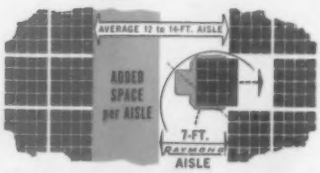
LIFTS 4,000 LB. LOADS 20 FEET HIGH FROM A 7-FOOT AISLE

How wide are the storage aisles in your plant or warehouse . . . 12 feet . . . 14 feet? If so, you're wasting nearly half the width making room for conventional-type 4,000 lb. capacity tiering trucks.

The new RAYMOND Reach-Fork right-angle tiers pallet loads up to 20 feet from aisles as narrow as 7 feet* . . . nearly half the width counterweighted trucks require . . . giving you an extra row of storage for every 12 foot aisle now used!

This is not a "beefed-up" model of a truck designed 10 years ago . . . but a brand new unit . . . built from the ground up to withstand tough, continuous performance, fully loaded, indoors or out . . . on long ramps . . . on slippery or uneven floors . . . and in narrow RAYMOND aisles. Does all this at fast travel and elevating speed! Operates hour after hour, day after day with minimum maintenance—there is no other truck like it! Send TODAY for Free Bulletin containing complete details.

*for exact aisle width consult your RAYMOND representative.



Ask about Raymond's lease-rental plan!

The RAYMOND CORPORATION
3297 Madison St., Greene, N.Y.
Please send new 4000 lb. Reach-Fork bulletin

NAME TITLE
COMPANY
STREET
CITY STATE

Career Opportunities for Product Design Engineers—Write RAYMOND Today!

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Small-Parts Degreaser uses vibrating spiral elevator to move work rapidly through non-flammable cleaning solvents and vapors. Needs no tote pans or baskets. Compact, low-cost Vibra-Bantam fits into most high-production, automated set-ups. *Manpro Corp.*

142—Metal Detector electronically locates all types of ferrous and non-ferrous metals. Prevents damage caused by tramp metal. Produces signal that can be used to trigger alarm, stop conveyor, mark, divert, or reject faulty material. *Morehouse Machine Co.*

143—Pre-Wired Raceway, with multi-outlets, can be expanded to house growing electrical needs. Eliminates costly on-the-job cutting and splicing by use of standard flexible cable to bypass corners, other obstructions. Comes in 2- or 4-ft. sections. *Miroflector Co.*

Turn the page

CAN COLOR CONDITIONING SAVE YOU MONEY?

You bet it can. To find out how, you might ask a specialist like Ed Dickinson. Ed's a Du Pont "Color Counsellor," one of more than 175 specially trained sales representatives whose job it is to help you put the power of color to work—profitably. But let Ed tell it himself:

"When it comes to maintenance painting, there are 2 ways you can save money. Naturally, your first consideration is quality. Believe me, there's no substitute for paints like Du Pont—tough, durable and right for the job. And to make sure they *are* right for the job, our recommendations are based on a thorough analysis of your particular maintenance problem.

"But that's only half the story when you specify Du Pont finishes. Equally important is what we call our Color Conditioning Plan. You see, research and experience have long demonstrated the power of color to affect people. Du Pont Color Conditioning puts that power to work for you. It's the scientific application of color to reduce accidents, cut down absenteeism, improve employee morale and boost efficiency. The result: an *extra bonus* of *savings*."

There's a man like Ed Dickinson in *your* area, ready to provide expert technical help in selecting the right colors and paints for you. To learn who he is, and to receive the 28-page booklet, "How to Put Color to Work," write: E. I. du Pont de Nemours and Co. (Inc.), Finishes Division, Dept. F-611, Wilmington 98, Delaware.

* * *

Edward E. Dickinson has been with Du Pont's Finishes Division more than 20 years. As a Du Pont "Color Counsellor," he's had extensive experience solving problems of paint maintenance for schools and institutions throughout North Carolina. Personally responsible for the development of complete Color Conditioning programs in a number of newer schools, he's also initiated similar plans for various industrial installations.

DU PONT COLOR CONDITIONING PAINTS

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Here's How To Handle FLAMMABLE SOLVENTS With Production-Line Efficiency and Maximum Safety...

SWABBING & SMALL PARTS CLEANING

Plunger Can

For quick, one-hand moistening of swab, brush or cloth. Depressing spring loaded dasher pumps measured quantity of fluid into cup. Release and excess drains back into can. 5 sizes—dashers 1 to 7" dia. FM approval*.

Bench Parts Washer

Keeps workers hands out of solvent. Removable parts basket has handle. Depress spring mounted fire baffle dasher for solvent, release to drain. Without basket, large cloths or swabs may be saturated. 3 pint capacity. Basket and dasher—5⅝" dia. FM approval*.

WASHING & CLEANING OPERATIONS

Wash Tank

Two handled perforated basket for fast, easy parts agitation. Self-draining by resting basket on lugs at top of tank. Renewable fusible link melts at 160° F, automatically drops cover to snuff out fire. 4 sizes ranging from 8½"x 8½"x9¾" to 15"x15"x 15". FM approval*.

Machine Bench Can

Attaches to bench alongside of machine. Operator cleans and rinses parts by depressing fire protective metal dasher. Size 10" x 7" x 8". FM approval*.

Foot Treadle Dip Tank

Work-high dip tank with self-closing cover operated by foot treadle. Designed for washing large parts. Safety air check cushions accidental fall of cover. 24¾" long x 13" wide and 8¾" deep. FM approval*.

Air-Matic Parts Washer

Air Motor moves basket thru solvent, automatically cleans parts while machine operator continues production. Fusible link drops cover automatically to snuff out fire. Operates on 25-50 p.s.i. air. Size 15"x15" x21". FM approval*.

Swab Can with Reservoir

For applications where large quantities of solvent are required. Supply tank mounted on common base with applicator can. Valve permits operator to replenish liquid supply at bench. Perforated metal fire baffle dasher. 2 sizes—1 gal. and 5 gal. capacity. FM approval*.

LOOKING FOR MONEY-SAVING IDEAS?

Protectoseal Catalog has many time and labor-saving suggestions for handling flammable solvents in production applications. Sent without obligation.

**Factory Mutual Laboratory approval*

THE PROTECTOSEAL COMPANY

1962 South Western Avenue Chicago 8, Illinois

IN CANADA: SAFETY SUPPLY COMPANY, TORONTO

FACTORY/EQUIPMENT NEWS

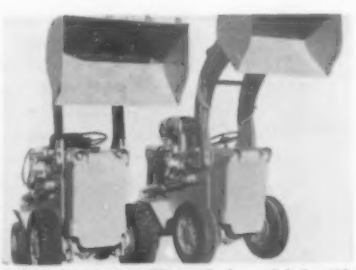
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

144—Polyester Tank, reinforced with glass fibers, resists corrosive action of acids, alkalies, and bleaches at elevated temperatures. Comes in stock sizes with capacities from 20 to 20,000 gal. Translucent, it shows liquid level. *Justin Enterprises, Inc.*

145—Die Protector, for punch presses, prevents die damage due to double heading. Can also be used to count parts. Three detecting methods: photoelectrically, by impact, or RF coil. Detects parts of any shape or material moving at high speed. *Clark Controller Co.*

146—Machine Mount controls vibration and shock; eliminates need to lag down machinery. Made of specially processed glass fibers; mounting provides excellent isolation. Installs quickly on mobile or permanent machines. *Consolidated Kinetics Corp.*

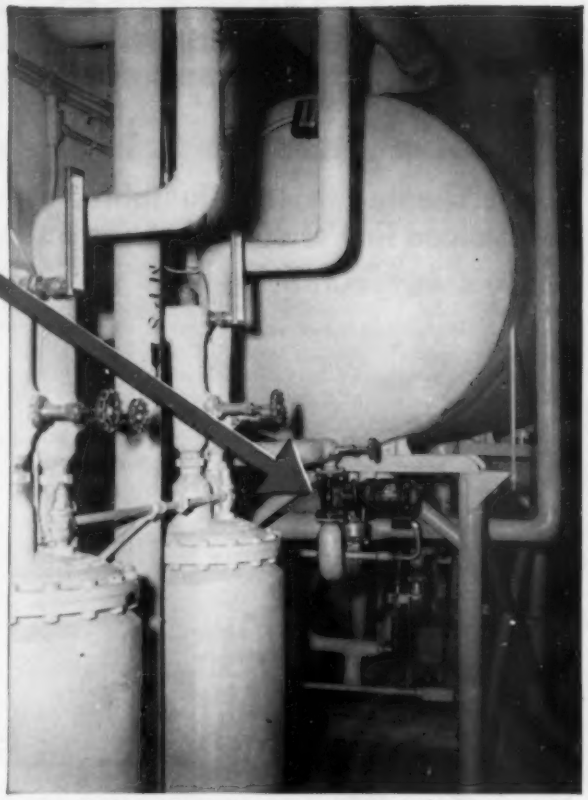


147—Tractor Shovel has high lift (right), compared to standard model (left), to handle bulk loads for extra-high dumping. Provides 7-ft.-2-in. clearance with 43-deg. dump angle; 1600-lb. capacity. Comes with 12- to 27-cu. ft. buckets. *Yale & Towne Mfg. Co.*

Turn the page

B&G ALL-BRONZE BOOSTERS

FOR LONG LIFE IN CIRCULATING HOT OR COLD RAW SERVICE WATER FOR FAUCET OR INDUSTRIAL USES

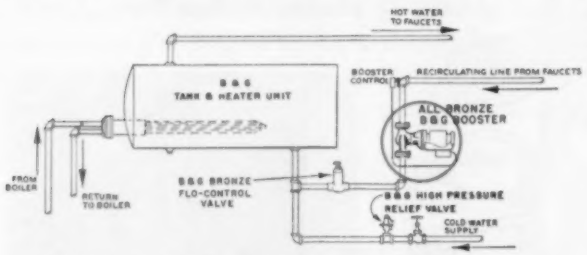


Where hot or cold service water is to be pumped, the use of an all-bronze pump is imperative. Otherwise, the corrosive effects of continuously pumping fresh water materially shortens pump life.

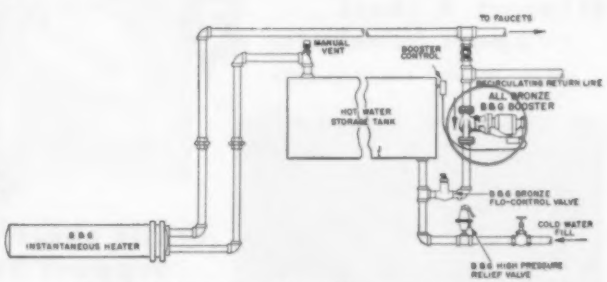
The B&G All-Bronze Booster is specifically built for service water pumping applications. In such systems, the Booster can be installed in numerous ways to step-up efficiency, increase hot water production and reduce heating costs. It is immune to corrosion, hence will give years of dependable service.

For *quiet* operation, failure-proof performance and long life, the B&G Booster is the *preferred* pump.

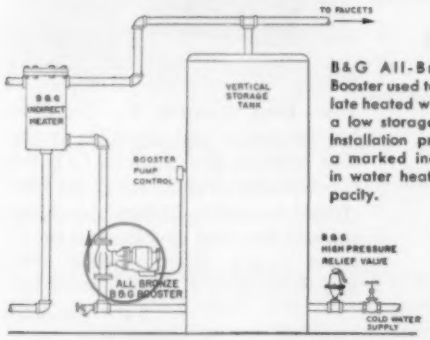
Installation of B&G All-Bronze Booster in Chrysler automatic transmission plant at Kokomo, Indiana. This small unit handles the circulating requirements of the service water heating system.



B&G All-Bronze Booster used on recirculating line from hot water faucets maintains hot water at fixtures at all times. Recommended on all installations, particularly where long plumbing lines are used.



All-Bronze B&G Booster used to provide an extra supply of hot water from an undersized boiler. Semi-tankless hook-up maintains initial supply of hot water.



B&G All-Bronze Booster used to circulate heated water to a low storage tank. Installation provides a marked increase in water heater capacity.

Send for Bulletin No. IA-856

BELL & GOSSETT COMPANY

Dept. GK-13, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

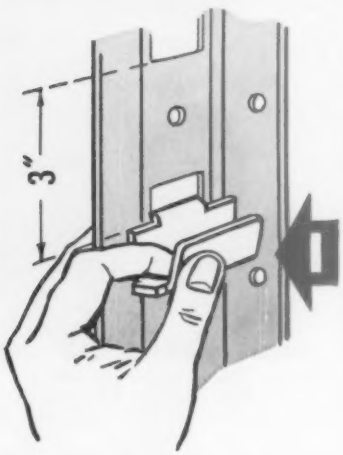
For more facts Circle 452 on Reader Service Card

CUT your stockroom expense with

BORROUGHS STEEL SHELVING

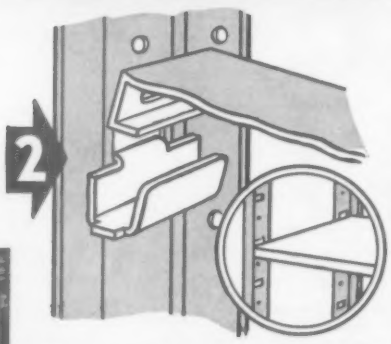
most simple, most adjustable, most rapidly assembled line of steel shelving on the market!

FROM THE VERY START of its installation, Borroughs Steel Shelving saves you time and labor . . . and that means you actually save money, too. This strong, rugged shelving has no equal in quick, easy assembly and adjustability . . . and no special tools are needed. Furthermore, except for the top shelf (2 bolts and 2 nuts), no other bolts or nuts are required to install or rearrange shelves. Every Borroughs shelving unit is complete in itself — no part depends on unit next to it — any unit or shelf can be moved independently. Before you choose shelving of any kind, get all the facts about Borroughs!



❶ Insert 4 shelf support brackets

. . . no fumbling with studs, bolts, nuts or lock washers.



❷ Tilt shelf into support brackets

and shelf is ready for loading. What could be easier!

Send for catalog Represented in Sweet's Catalog, Plant Engineering File 4G BO

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp® KALAMAZOO, MICHIGAN

FACTORY/EQUIPMENT NEWS

Begins on page 108

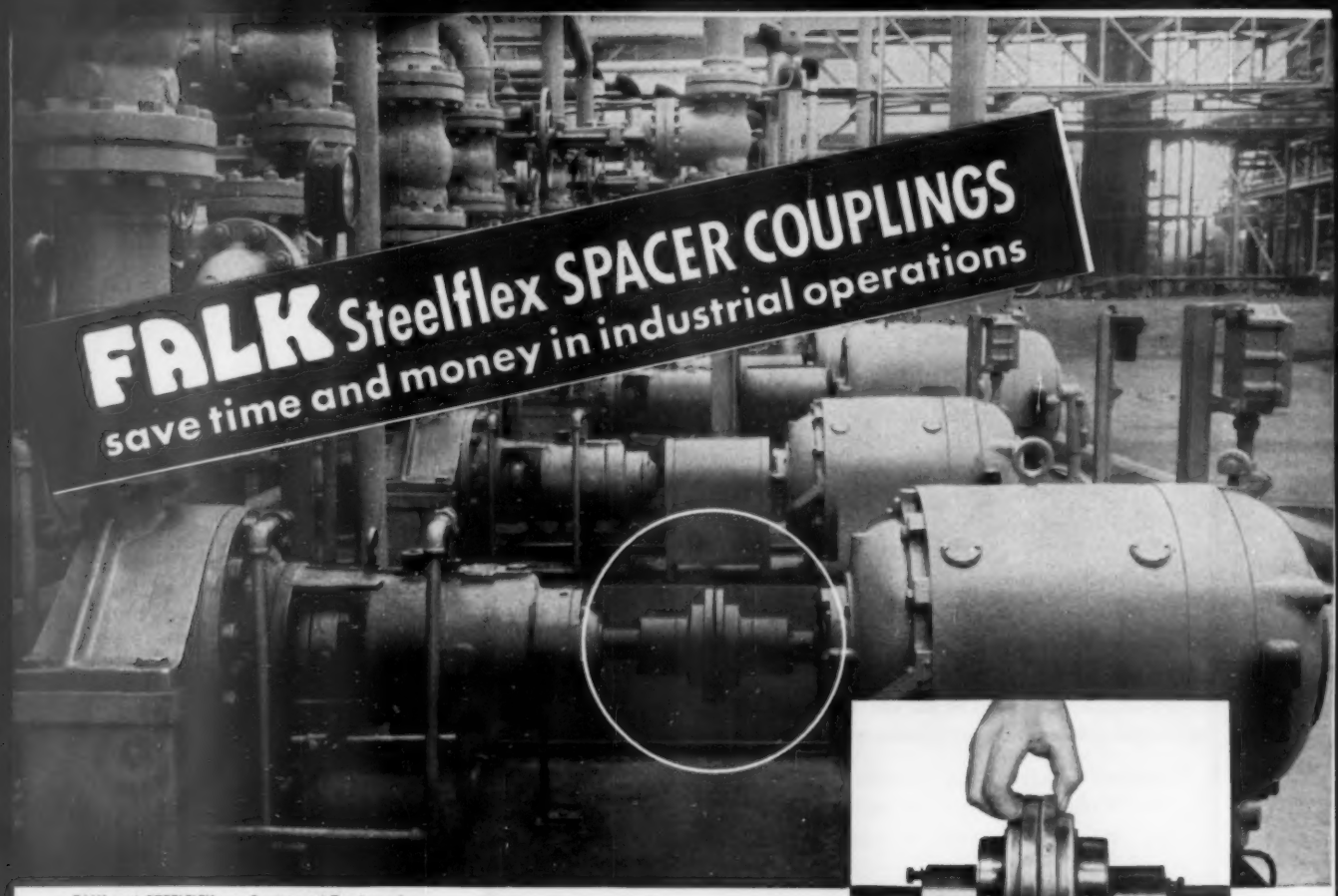
For more about these items, circle item numbers on Reader Service Card next to back cover.

148—Production Saw, for continuous cut-off work, doubles cutting rates of conventional machines. Compact, it uses 2-in.-wide saw band. Features electrically programmed stock indexing, micrometer-length adjustment (to 24 in.), automatic chip disposal. *DoAll Co.*

149—Current Limiting Unit protects against high-value short circuits, provides for current metering on 800 amp., 600 v. power circuits. Other units, for systems to 2000 amp., 240 and 660 v., provide protection to 100,000 rms. amp. *Hope Electrical Products Co.*

150—Dust Control, by electronic bombardment and negative ionization, reduces dirt particles to below 0.1 microns, so small they have little chance to settle. Eliminates smudging and fine dust problems in superclean rooms. Eight models: 5000 and 10,000 cfm. *CRS Industries, Inc.*

Turn the page



FALK and STEELFLEX are Registered Trademarks

Cut disconnect-reconnect time by as much as 50%

The FALK Spacer Coupling is specially designed for quick installation or removal *without disturbing the driving or driven unit.* This feature can save you up to 50% in disconnect-reconnect time when critical equipment—a process pump, for example—needs repair or replacement.

Here's another saving: with the FALK Spacer Coupling, you can quickly realign shafts *without the usual loss of operating temperature!*

And still another: you can remove or reinstall the FALK Spacer as a unit *without draining the lubricant.*

Because of its exclusive grid-groove Steelflex design, the FALK Spacer can accommodate residual misalignment—parallel, angular, or (most important) *both.* Also, it provides torsional resiliency that cushions shock and vibration. Thus it saves wear-and-tear on your connected equipment.

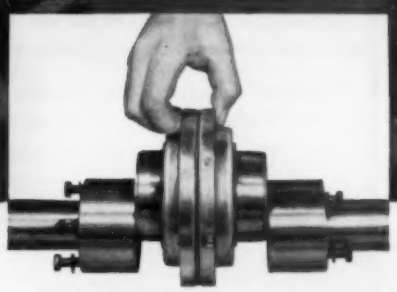
To prove these claims and enjoy these savings, install a FALK Spacer on one application—and see for yourself. Consult your FALK Representative or Authorized Distributor.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN

MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

Representatives and Distributors in many principal cities.

For more facts Circle 454 on Reader Service Card

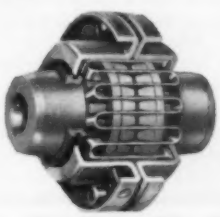


EASY AND QUICK TO INSTALL, DISCONNECT OR RECONNECT

First, mount shaft hubs to allow proper distance between hubs; then, align driving and driven units.

Second, compress Spacer to fit space between hubs and tighten cap screws to pull spacer hubs into the registered fit.

To disconnect, reverse the second step. No draining of lubricant necessary.



The heart of the FALK Spacer ...the basic Type F Steelflex

Write for Service Manual 4838

FALK

...a good name in industry

Ease the profit squeeze

with a PAYLOADER®

Brighton Electric Steel Casting Company reports the H-25 "PAYLOADER" improves operations several ways:

1. Provides more efficient mechanized handling for several different jobs.
2. Operates fast and effectively in close quarters.
3. Operator efficiency sustained during the full shift because of easy operation.
4. Maintenance is low in spite of hard usage.

Brighton Electric Steel Casting Company, Beaver Falls, Pa., makes piercer points for the seamless steel tubing industry, and has earned a fine reputation for uniform high quality and precision workmanship in this specialized field. Its decision to acquire a Model H-25 "PAYLOADER" has proved to be a wise one. This tractor-shovel has brought new efficiencies to their overall operation since it took over several sand-handling and castings-handling duties.

Efficient and Reliable. Foundry Foreman, Thomas Gillingham, says, "The H-25 'PAYLOADER' has many features that definitely increase foundry efficiency. One of these is close-area maneuverability. The operators claim ease of operation with accurate control of material load. It has rugged construction that stands up continuously under rough working conditions with simple maintenance."

Superior Mechanical Features. Speed, capacity, maneuverability and ease of operation are combined in the H-25 for big production all day long — thanks to 2,500-lb. operating capacity, power-shift transmission, torque converter drive, power-steering, power-transfer differential and fast, powerful hydraulic bucket control.

A Size for Every Job. For any bulk-handling job, indoors or outdoors, there is a *proven* "PAYLOADER" — up to 12,000 lbs. operating capacity. A nearby Hough Distributor is ready to show you how a "PAYLOADER" can "ease the profit squeeze". Return the coupon, or write:

HOUGH®

THE FRANK G. HOUGH CO.
755 SUNNYSIDE AVENUE
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Send "Industrial Materials Handling the PAYLOADER way"

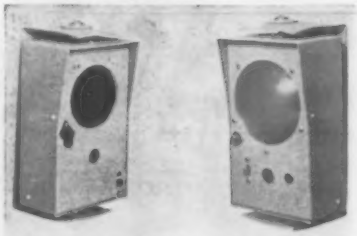
Name _____
Title _____
Company _____
Street _____
City _____
State _____

11-G-2

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



151 — Burglar - Intruder Alarm sounds off when invisible infra-red beam is broken. Projector can be set up to 250 ft. away from receiver in straight line, or around corners with mirrors. Transistorized, Lyne-O-Larm operates on low voltage power supply. *Walter Kidde & Co.*

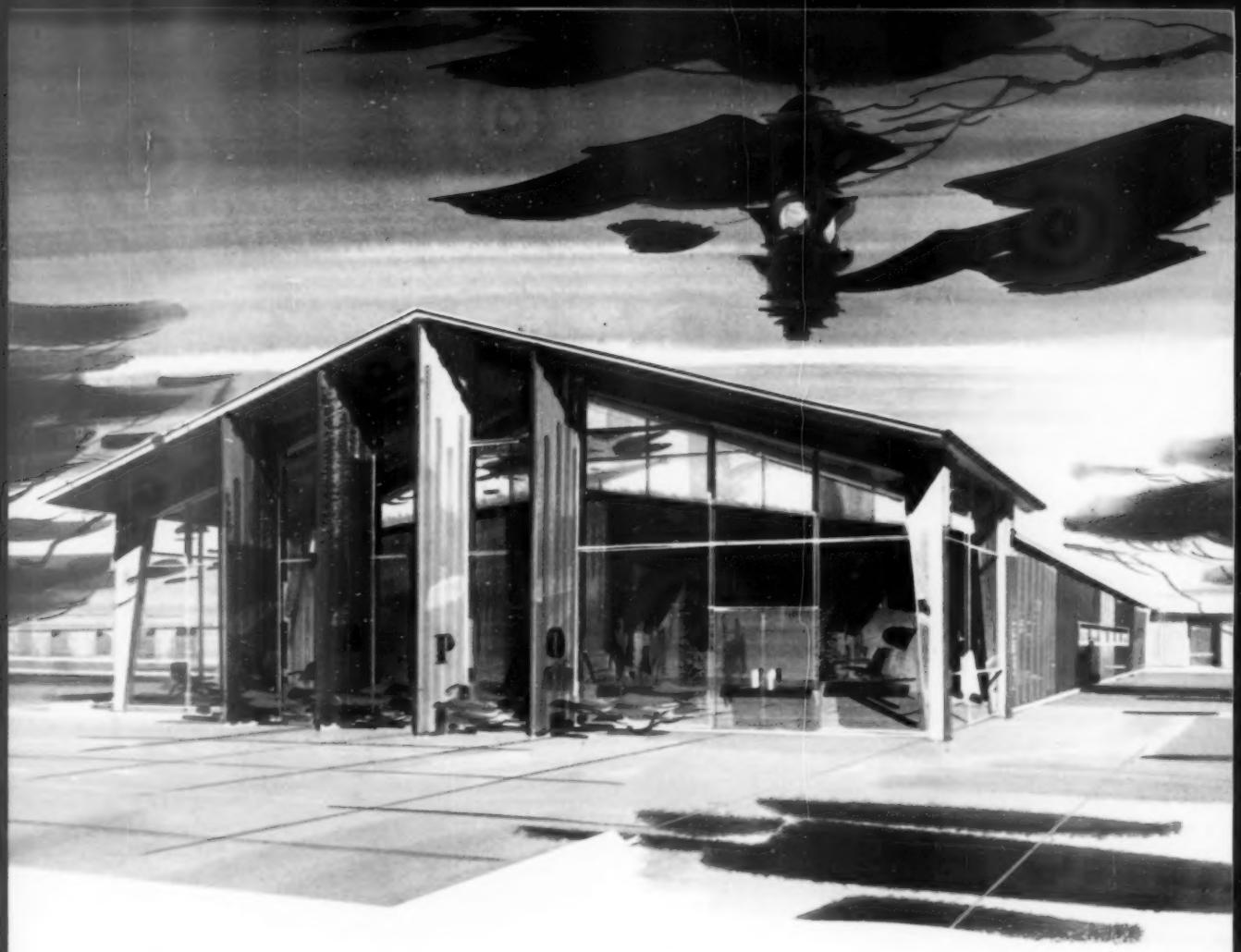
152—Conveyor-Feeder accurately feeds flaked, fibrous and other hard-to-handle materials to 1½ in. in diameter. Two models process up to 80 cfm. operating at 50% efficiency. Higher or lower efficiencies possible, depending on material. *Thayer Scale Corp.*

153—Valve Adapter converts manually operated process and control valves to automatic operation. You simply remove old stem and bonnet and screw adapter into place. No uncoupling or re-piping necessary. Fits most standard globe valves now in use. *Febco, Inc.*

Turn the page

For more facts Circle 455 on Reader Service Card

For more facts Circle 456 on Reader Service Card ➤



Handsome is and handsome does

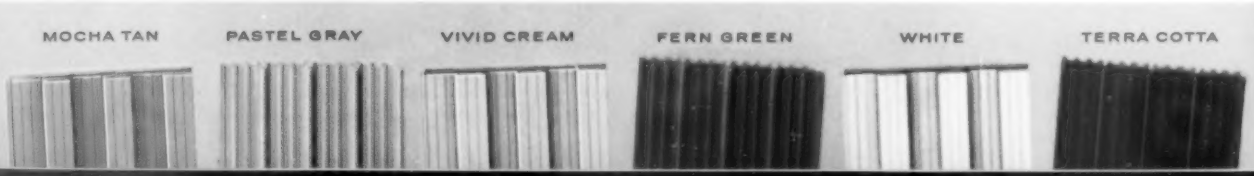
...colorful Butler Buildings are functional too!

It's no accident that Butler buildings are finished with the most striking *and* protective color offered in the industry—Butler-Tone™. Butler alone uses America's number one system of pre-coating metal panels. Butler alone coats both sides. Butler-Tone adds extra years of new-looking color and time-defying protection.

Add Butler-Tone colors to the industry's two outstanding wall systems, the widest range of sizes and types of rigid frame clear-span structurals, optional roof guarantee at nominal cost, the skills and experience of the finest nationwide Builder organization in the industry—and you have America's number one pre-engineered building value.

TURN THE PAGE TO SEE WHAT COLORFUL BUTLER BUILDINGS WILL DO FOR YOU...

CELEBRATING 60 YEARS
BUTLER
FABRICATING METALS



Coast to Coast

...industry finds advantages in

BUTLER BUILDINGS

Flick-Reedy Manufacturing Corporation, Bensenville, Illinois, winner of Factory Magazine's 1960 "Plant of the Year" award. ARCHITECT: *Zay Smith & Associates, La Grange, Ill.,* DESIGNER: *Norman Steenhof.*

Manufacturing . . . warehousing . . . distribution, industry finds that the Butler Building System suits all three functions.

. . . like floor space. Clear-spans bridge areas up to 120 feet.

. . . like overhead space. Rigid frame design provides space for lights, craneways, other fixtures. Raw and finished inventories stack to maximum pallet heights.

. . . like expandability. Adding to a Butler is easy, fast, economical . . . with practically full salvage of original materials.

No, there's nothing nebulous about the advantages our customers associate with Butler industrial buildings. Your Butler Builder (see "Buildings" or "Steel Buildings" in the Yellow Pages) will be happy to discuss other advantages, including financing. Call him . . . or write direct.

Southwestern Plastics, Houston, Texas

"See Sweet's Industrial or Architectural File—Section 8-B"

MBMA

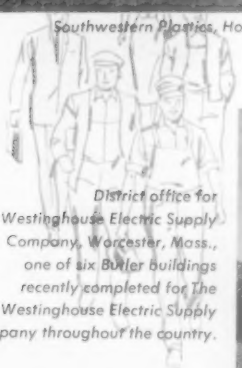
BUTLER

BUTLER MANUFACTURING COMPANY

7375 EAST 13th STREET, KANSAS CITY 26, MISSOURI

Manufacturers of Metal Buildings • Plastic Panels • Equipment for Farming, Transportation, Bulk Storage, Outdoor Advertising • Contract Manufacturing

Sales offices in Los Angeles and Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Kansas City, Mo. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. • Cleveland, Ohio • New York City and Syracuse, N. Y. • Washington, D. C. • Burlington, Ontario, Canada



District office for Westinghouse Electric Supply Company, Worcester, Mass., one of six Butler buildings recently completed for The Westinghouse Electric Supply Company throughout the country.

EYE PROTECTION IS NOT ENOUGH

B&L helps you fit the vision to the job with prescription safety lenses

To stop accidents before they happen, make sure your employees can *see well* on their jobs. For workers who need visual correction, the safest, most comfortable vision results by combining *correction* with *protection* in Bal-SAFE prescription lenses.

These lenses are products of a century of research and development. Their superiority is evident in their extra impact resistance, in their superb focus and surface qualities, and quality of ophthalmic glass used. Bausch & Lomb is the only manufacturer of professional quality ophthalmic lenses that operates its own glass plant—and controls glass quality from sand to finished product.

Local laboratory finishing is as superior as original factory product. All Bal-SAFE prescription lenses are heat treated by an exclusive patented process that gives them as much as 14 times the impact resistance required by government standards. You pay no more for this extra safety margin.

How do you make *sure* your employees see right for their jobs? A B&L representative will be glad to explain how your workers may benefit from Bal-SAFE prescription lenses, and how the B&L Ortho-Rater quickly and easily pinpoints those who need professional eye care. Call your supplier, or write: Bausch & Lomb Optical Co., 90111 Lomb Pk., Rochester 2, N. Y.

BAUSCH & LOMB

Protection-PLUS Safety Products

protection + economy + worker acceptance

THE BRIDGE TO *Progress* AND *Safety*...

The bridge in this picture, designed to carry both horse power and man power across the Root River, represents a step to further expansion of Western Printing and Lithographing Company facilities in Racine, Wis.

Western selected Globe's Safety GRIP-STRUT grating on this bridge for greater safety and for greater economy. Safety GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded, in steel or aluminum, in standard sizes and gauges. It presents an open space, in a diamond pattern, in excess of 55% of the area for a positive NON-SKID footing in all directions. It is also ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

IMPORTANT SAFETY FEATURES:

Fire proof, slip proof, maximum strength, minimum weight, easy to stand and walk on, cool in summer, warm in winter.

BIG ECONOMY FEATURES:

For balconies—no extra light needed below—no extra heat. No extra supports needed—Channels are integral part of the material. No secondary sprinkler heads necessary. Self cleaning. Cut and installed like lumber by your own maintenance force. Low in original cost.

Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING".

GRIP-STRUT PATENTED

PRODUCTS DIVISION

THE GLOBE COMPANY

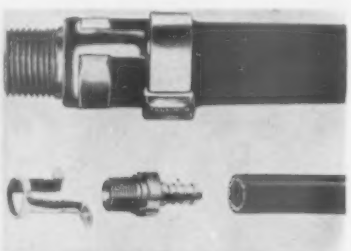
4014 S. PRINCETON AVENUE
CHICAGO 9, ILLINOIS

FACTORY/EQUIPMENT NEWS

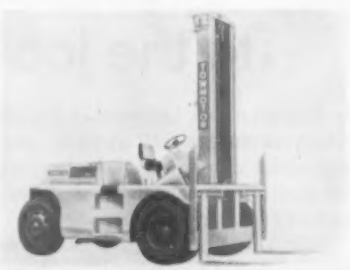
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

154—Universal Test Station automatically tests variety of electronic components. Eliminates need for various types of testing equipment, reduces testing time. Testing procedure controlled by punched tape and preset tolerance limits. *Consolidated Avionics Corp.*



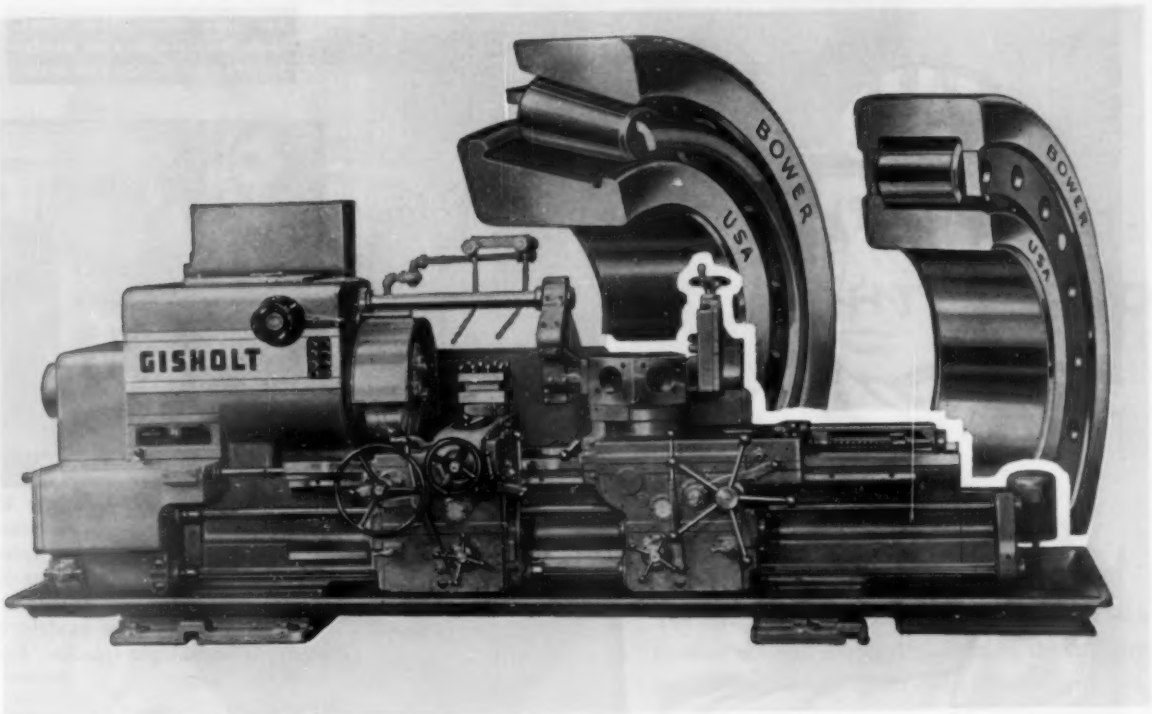
155—Hose Coupling Assembly, in 5 sizes from ¼- to 1-in. ID, fits any hose OD or wall thickness regardless of construction or type of service. Used for hydraulic, double and single braid, and steam hose where positive lock to hose nipple is needed. *Band-It Co.*



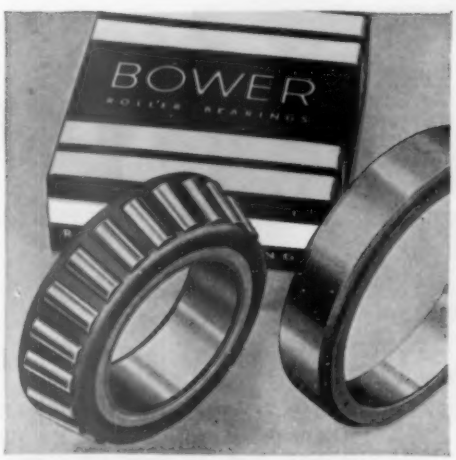
156—Fork Lift Truck, for heavy-duty use, has load capacities from 10,000 to 24,000 lb. Either gas or diesel powered, with 86- to 120-in. wheel base, forks adjust from 2 to 66 in. Low-profile body and welded frame. Reinforced with heavy deck plates. *Towmotor Corp.*

Turn the page

Better products, *faster*, from your Bearing Specialist:



Bower Roller Bearings...the finest to keep production levels up...costs down!



You can rely completely on Bower bearing quality and high availability for every replacement need to keep machines in service!

It pays to make replacements with Bower, the bearings used by the original equipment manufacturers. Maintenance men know the importance of this practice, especially when Bower tapered or straight roller bearings are used by leading machinery makers. They also know the importance of ready availability for fast service.

Call in your Bearing Specialist. Let him show you firsthand the refinements of Bower bearing design. He'll point out the features engineered to insure better roller lubrication and to provide the minimum of running friction. He's always nearby.

BOWER ROLLER BEARINGS

BEARING BOWER ROLLER BEARINGS SERVICE

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DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN

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ABSOLUTELY FREE

You pay nothing for application analysis, technical assistance, uncomplicated service and delivery. We *give* service!

In evaluating maintenance finishes from DeSoto, consider not only our finer products—KOROPON (catalyzed) and HI COR (vinyl)—but consider also that we offer a system of engineered corrosion control. Before you *buy* anything you enjoy *free* the services of experienced survey engineers who analyze your corrosion problem carefully to be able to recommend the *best* coating in the *right* color at the *lowest* possible cost. Whether for new construction or for maintenance painting DeSoto represents your best long-range *and* short-range buy. *Your inquiry will receive our immediate attention.*

For technical details see our 8-page catalog insert in Sweets 1961 Industrial Construction File.

DeSoto Chemical Coatings, Inc.

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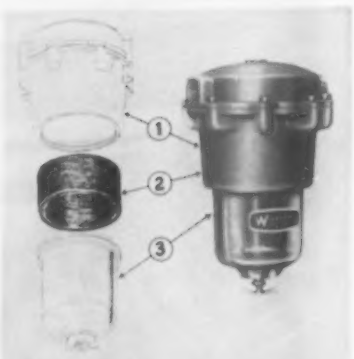
FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

157—Drill Press, 17 in., is low-priced unit that provides an internal depth stop with long (5 in.) spindle travel. Flexible speeds, remote control operation. Manual or automatic feed, in bench or floor models, and in single or multiple spindles. *Rockwell Mfg. Co.*

158—Electric Heaters have fins widely spaced for efficient, economical operation even in dirty atmospheres. Compact, has built-in thermal overload protection. In 17,065 to 85,325 Btu./hr. capacities, 5 to 25 kw. and 208 to 480 v. *Edwin L. Wiegand Co.*



159—Compressed Air Filter offers low-pressure drop, 5-micron filtration, high air flow, big sump capacity. Made possible by extra casting between cover and bowl of filter to house larger filter. In ¼- to 5-in. pipe sizes, 16 to 3100 cfm., at 100 psi. *Wilkerson Corp.*

Turn the page

NEW FRACTIONAL HORSEPOWER SPEED-TROLS

Infinitely variable speeds from 4660 to 1.2 rpm; 10 to 1 variation, ¼, ½, ¾ horsepower ratings

COMPACT

WHERE IT COUNTS...

AND LIGHTER TOO

The new Sterling Fractional Speed-Trol has the shortest over-all length dimension in the industry and is up to 15% lighter than competitive units.

The new Fractional Speed-Trol retains the rugged durability famous in the Sterling line of integral variable speed drives and features larger pulley diameters for a cooler running, longer lasting belt.

The new fractional unit may be foot mounted in any position, shaft low or shaft high, case upright or horizontal, shaft horizontal, vertical or "C" Flow or can be furnished with Type C bracket for face mounting directly to machinery. Important NEMA standard dimensions for shaft height and diameter are retained to permit substitution with standard motors.

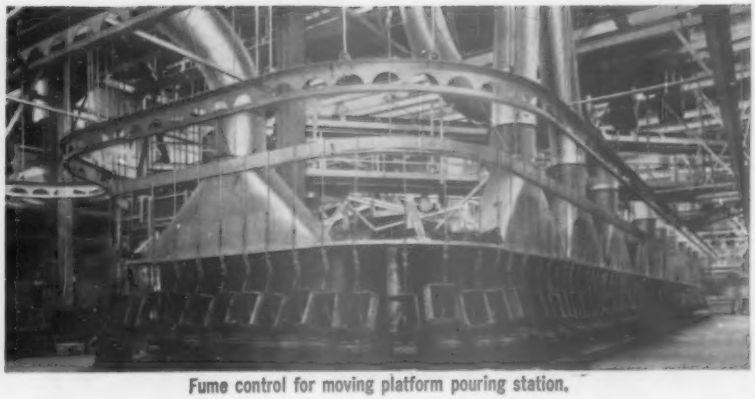
The Fractional unit is available in single phase, three phase; drip proof, totally enclosed, explosion proof.

New Fractional Speed-Trol is a variable speed gear motor, too.

Get the full story about the new Sterling Fractional Horsepower Speed-Trol, write for Bulletin # 201.

STERLING
ELECTRIC MOTORS, INC.
A Subsidiary of Hathaway Instruments, Inc.
5401 TELEGRAPH ROAD, LOS ANGELES 22, CALIFORNIA

Offices and stocks in all principal cities.
Over 400 distributors throughout the country to serve you.



Fume control for moving platform pouring station.

No two fume control problems are alike!

Moving platform pouring station, lower production requirements.

Since no two fume control problems are alike, a Kirk and Blum engineering survey determines the exact nature of *your* specific application. It's all part of K & B's *complete* service to assure you the best system for your particular need, all factors considered.

From survey time until the system is completed and in operation, Kirk & Blum handles the entire job with one undivided responsibility . . . a condition only possible when you have *one* source for all service, *one* guarantee for all components.

Write today for the new 52-page K & B Catalog or a no-obligation survey of your particular problem. The Kirk & Blum Mfg. Co., 3209 Forrer St., Cincinnati, 9, Ohio.

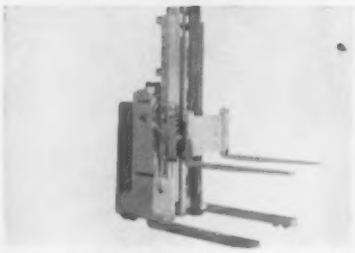
KIRK & BLUM

Complete Fume and Dust Control Systems

FACTORY/EQUIPMENT NEWS

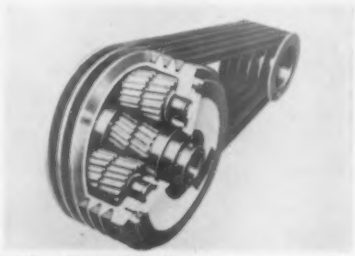
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



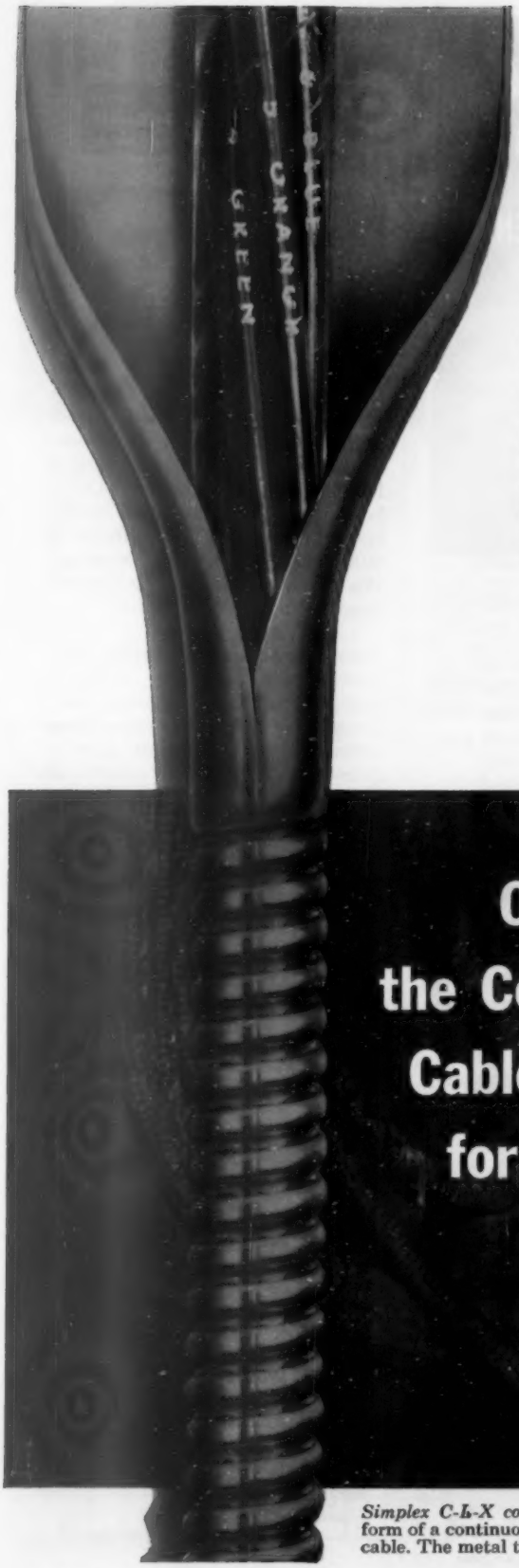
160—Lift Truck, 24 v., has side shift attachment that moves load 4 in. to either side of center without moving truck. Speeds handling in narrow aisles and tight spots. Attachment accepts rams, gooseneck cranes, other accessories. *Lewis-Shepard Products, Inc.*

161—D-C Motor and Generator line features industrial TEFC and non-ventilated, and explosion-proof types. Uses high-heat silicone in Class B insulation system. In ½ to 60 hp., 300- to 3500-rpm. motors, ¾ to 40 kw., 850 to 3450 rpm. generators. *Westinghouse Electric Corp.*



162—Roto-Mission is compact differential planetary gear transmission (shaft mounted) with very high torque capacities and reductions to 270:1. V-belt fits in grooves on gear case assembly. Gears cannot break despite severe abuse. *Airborne Accessories Corp.*

Turn the page



The cable you see here is *not* interlocked armor. It is Simplex' new C-L-X . . . the completely sealed cable system.

- Completely sealed against liquids and gases.
- Protected against mechanical damage by a continuous, corrugated metallic sheath.
- As pliable as unsheathed cable because of its corrugated design.
- Needs no separate duct or conduit in any environment.
- Nonferrous sheaths can be designed to function as grounds or shielding.

Simplex C-L-X is impervious to liquids and gases, is resistant to all forms of mechanical damage, and is as pliable as unsheathed cable.

Available with sheaths of steel, aluminum, copper or bronze, and with or without outer plastic jacketing, Simplex C-L-X provides the ideal solution for almost any installation, particularly those in which cable life is limited by severe ambient conditions.

Write today for illustrated brochure containing application and engineering information.

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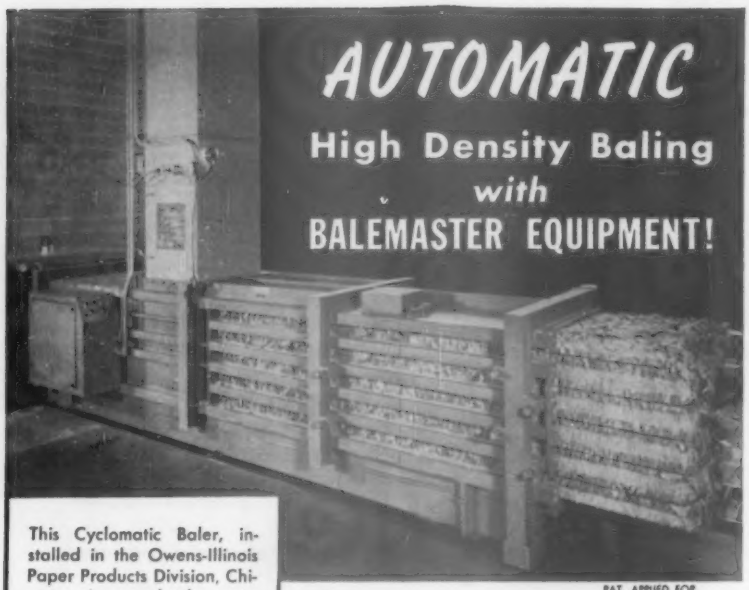
Only Simplex C-L-X . . . the Completely Sealed Cable System . . . is Built for Torturous Conditions Like This

Simplex C-L-X combines cable and duct in one integrated system. Metal, in the form of a continuous flat strip, is formed into a welded tube around the insulated cable. The metal tube is then corrugated to form Simplex C-L-X.

For more facts Circle 463 on Reader Service Card



AUTOMATIC
High Density Baling with BALEMASTER EQUIPMENT!

This Cyclomatic Baler, installed in the Owens-Illinois Paper Products Division, Chicago, is completely automatic. It is fed by the Cyclomatic Pneumatic Conveying System which picks up scrap from the entire plant. A Cyclomatic Hogger, not shown, reduces the larger pieces of scrap to a size suitable for air conveying and efficient baling.

PAT. APPLIED FOR

PAT. APPLIED FOR

One of many Cyclomatic pick-up stations in the Owens-Illinois Paper Products Division Plant. Scrap is quickly and automatically conveyed to the Cyclomatic Baler at a rate of 100 pounds per minute through each pick-up station.

√ If you have a pneumatic-conveying system now all you need is CYCLOMATIC® BALING EQUIPMENT . . specifically designed to provide you with a modern efficient baling system with plenty of reserve power to meet all your requirements.

√ If you do not use pneumatic-conveying or if your present system is not adequate to properly prepare materials for automatic baling, Balemaster can design and furnish a modern, efficient pneumatic-conveying system for your plant . . . or Balemaster can design and install the complete Cyclomatic System for *automatically handling and baling scrap.*

√ The Cyclomatic System is completely automatic—no manual handling of scrap from the point of generation to the finished bale.

For the one company that designs, engineers, manufactures and can install a complete integrated system for your needs — depend on Balemaster.

***CYCLOMATIC* Means Automatic Scrap Material Handling and Baling.**

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FACTORY/EQUIPMENT NEWS

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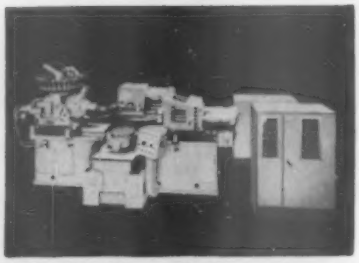
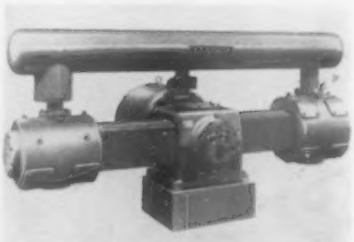


163—Machine Tool, tape controlled, is said to bring production line efficiency to batch lots. Drills, bores, reams and taps parts within size of 12-in. cube in increments of 0.001 to ±0.0005 in. accuracy. Has two standard and two optional heads. *Hughes Aircraft Co.*

164—Temperature Controller photoelectrically measures infra-red radiation of heated moving parts (over 500 F.) without contact. When temperature exceeds preset level, it trips relay. Measures objects as small as ⅛ in. sq. at 1 ft. distance. *Clark Controller Co.*

165—Spring Tension Gauge measures "breakaway" force needed to move an object held by spring member, inertia or friction. Good for d-c motor maintenance or where engines or electrical equipment is used. Useful for close-quarter testing. *American Machine & Metals, Inc.*



166—Air Compressor, balanced/opposed type, can be used in applications where the air stream must be uncontaminated by lube oil. Compressor cylinder, with parts of self-lubricating Teflon, is isolated from main compressor lubrication system. *Clark Bros. Co.*

Turn the page

In Theory Anyone Can Make Lighting Fixtures to RLM Standards

BUT

only RLM-Labeled fixtures are guaranteed to meet these standards, a guarantee made possible only by both the MANUFACTURER and the Certification Program of THE ELECTRICAL TESTING LABORATORIES

THE FINAL INGREDIENT

You often hear the question, "Is it equal to RLM?"... or you see in specifications the words: "RLM or Equal"... of course, theoretically it is possible to meet RLM Specifications. It is in the *guarantee* that the RLM Label cannot be equaled! The heart of the RLM Label is in its warranty of conformance to these RLM Specifications. This guarantee of the manufacturer to buyers is based not on specially submitted samples to a laboratory or an outdated test... but on a continuous, current testing and certification program conducted by the independent and world famous ELECTRICAL TESTING LABORATORIES OF NEW YORK.

Types of RLM-Labeled equipment available from each of the 22 participating manufacturers is shown in the chart.

PRODUCT QUALITY
LIGHTING QUALITY

These TWIN QQ's to Industrial Lighting Success are guaranteed with all lighting equipment bearing the RLM Label. Write for FREE RLM Specifications Book.

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Suite 829N, 326 West Madison Street, Chicago 6, Illinois

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HIGH PRESSURE ASBESTOS PACKING
ROTARY & CENTRIFUGAL PUMP PAC
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INGS • HYDRAULIC
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CRISS-CROSS RAID • COPPER WIRE
AL • SPIRAL WOUND GASKETS • AIR-C
TEFLON JACKETED GASKETS • PNEUM
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FACTORY/EQUIPMENT NEWS

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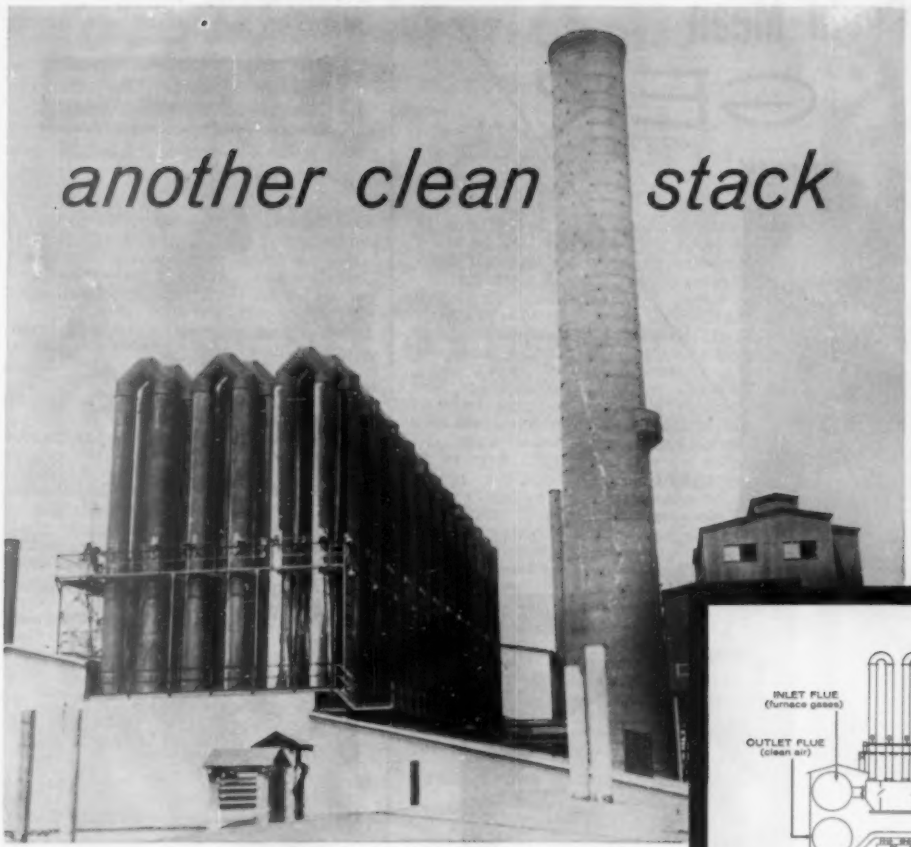
167—Tape Control System operates with most precision machine tools or devices needing accurate positioning to ±0.0001 in. and repeat accuracy to ±0.0005 in. Uses linear transducer that does not wear. Accuracy not dependent on screws, racks, etc. *Square D Co.*

168—Portable PA System comes in lightweight luggage-type carrying case. Contains mike, 10-watt amplifier, speaker, outputs for external speaker and tape recorder. Cover converts to lectern when open. Operates on two lantern batteries. *Kinematic, Inc.*

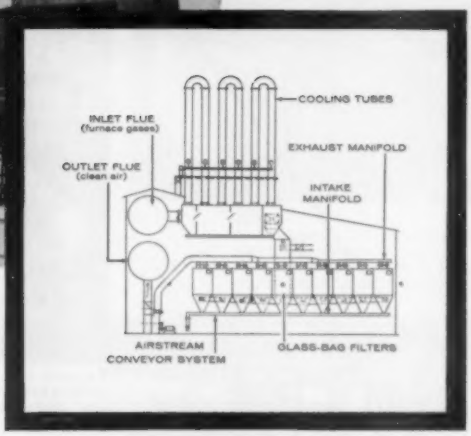
169—Screwdriver System automatically sorts, meters, and drives (to preset torque) screws, pins, bolts, from ⅛ to 2¼ in. at speeds to 7000 per hr. Prevents feeding screw to driver unless previous one is seated. Needs no inspection. *Clyde Engineering & Mfg. Co.*

Turn the page



(Left) Cooling tubes atop Glass-Bag Filter housing lower furnace gas temperature from 800°F. to 450°, a full 150° below maximum advisable operating temperature. Clean stack proves that filter removes all visible dust.

(Below) System consists of 12 ten-compartment Glass-Bag Filters. Gases at 800° are blown from electrostatic precipitator to cooling tubes which discharge to filter system, resulting in daily collection of about 35 tons of material.



. . . "trade mark" of the Dracco Glass-Bag Filter

Freedom from hot, corrosive dust created by metallurgical processes is one of the many benefits of using Glass-Bag Filters. The clean stack shown in the unretouched photograph testifies to the effectiveness of the Dracco system at Hudson Bay Mining & Smelting Co., Ltd., Flin Flon, Manitoba.

Here is what the system does for Hudson Bay:

- **handles 450,000 cfm of mixed reverberatory furnace and converter gases at 450°F.**
- **recovers approximately 35 tons of valuable metal oxide dusts daily.**
- **maintains operating temperature to prevent condensation of exhaust gases and formation of corrosive acid dews.**
- **eliminates air pollution**
- **reduces cooling equipment requirements, and costs, by 50% over conventional methods.**
- **provides low-maintenance operation and gentle bag cleaning with SWING-CLEAN.**

Glass-Bag Filters, the most advanced equipment now available for fighting air polution and hot dust, have been proved-in-performance in the metallurgical, chemical and cement industries. Virtually 100% collection efficiency is maintained at temperatures to 600°F. Maximum bag life is assured by either of two patented cleaning devices: (1) a mechanism for dust removal by sonics and (2) SWING-CLEAN, gentle swaying action.

For full details on how Glass-Bag Filters can help you lick that hot dust problem, write: Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors dust control equipment

FULLER COMPANY GENERAL OFFICES

For more facts Circle 467 on Reader Service Card

Where Dirt Could Mean DANGER...

North American Aviation plant, Downey, Calif.

Vacuum cleaning during the final assembly provides all-important "last minute" protection.

You'll find SPENCER Vacuum Systems

Built-in vacuum systems by Spencer are being relied on increasingly by industry to protect product quality during inspection and assembly.

In this "white room" at the Autonetics plant of North American Aviation, for example, a Spencer system is utilized for:

1. Frequent floor cleaning to maintain critical standards of dust-free cleanliness.
2. Final cleaning of components—by use of bench inlets at the individual assembly stations.

Whatever your needs in a built-in system—or industrial portable vacuum cleaners—it will pay to check with SPENCER . . . world leader in industrial vacuum cleaning equipment.

Request Catalog #155B

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

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FACTORY/EQUIPMENT NEWS

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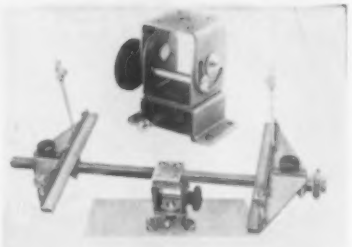
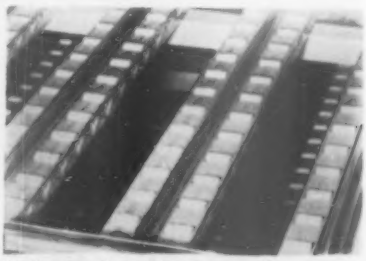


170—Work Positioner holds workpiece at any practical angle. Rototilt adjustable to 135-deg. tilt, rotates full 360 deg. Separate tilt and rotating controls. Can be rigidly mounted on work benches, conveyor lines, through holes in base. *Technical Devices Co.*



171—Roller Conveyor, for automatic gravity feeding of storage racks, handles products to 80 lb. Polyethylene rollers are set in self-lubricating steel channels. Back-of-rack loading. Fast order picking with automatic stock rotation. *North American Equipment Co.*

172—Gas Heater has two interconnected direct-fired duct furnaces capable of heating 1600-sq. ft. floor area from height of 36 ft. without ductwork. Propeller fans distributing air need only ½- to 1-hp. motor. In 300,000 to 600,000 Btu./hr. inputs. *Modine Mfg. Co.*

Turn the page

Louden Monorail
cuts the cost of
Interplant Transport

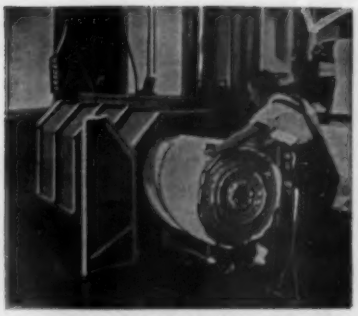
As companies grow and expand production facilities, the problem of interplant transport of materials, parts or semi-finished products is often encountered. Time and again Louden Monorail proves to be the perfect answer. With Louden's Selectomatic Control, such an interplant transport system can be virtually *automatic*.

The Louden Selectomatic Interplant Transport System at the Marion, North Carolina, plants of the Clinchfield Manufacturing Company is a good example. Here the problem developed of transporting tons of cloth daily between three separate buildings. 650 feet of Louden Monorail with a weather-proof car in almost continuous operation provides the perfect answer. The car can be raised and lowered as required for charging and discharging loads; the destination desired is preset by the control; transport is speedy, trouble-free, automatic. It is estimated three men with trucks would have difficulty doing the same job.

Louden Selectomatic Interplant Transport Systems can do many things not required in the Clinchfield installation described. It can automatically transport materials unattended from point to point anywhere in or about your plant, and it can select the shortest and most direct route to its destination. It can travel from floor to floor and building to building, open doors to let itself through and close doors behind it . . . building doors, floor doors, oven doors. It places loads in ovens or in banks of infra-red dryer lamps, turning the heat on and off as needed. It stops promptly when there is a load ahead or when it does not have the right of way, and resumes travel when the way is clear. It stops accurately at its destination and even loads and unloads its own carriers with certain classes of materials. It returns empty carriers to point of origin or places itself in storage awaiting its next call.

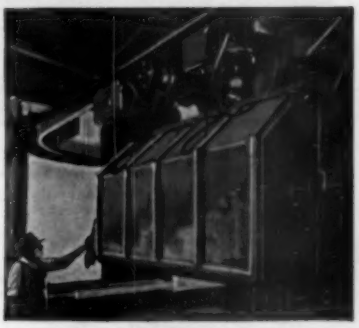
Louden Automatic Materials Handling is the guaranteed product of the pioneers and oldest company in the field of specialized monorail handling. Both the Louden field representatives and the factory engineers are highly trained specialists in the field of overhead materials handling. When you have a materials handling problem or any plant problem involving lifting and transporting loads, call on Louden for suggestions. This will cost you nothing but may prove to be the most profitable move you have ever made.

THE LOUDEN MACHINERY COMPANY
1105 Broadway, Fairfield, Iowa
A Subsidiary of Mechanical Handling Systems Inc.

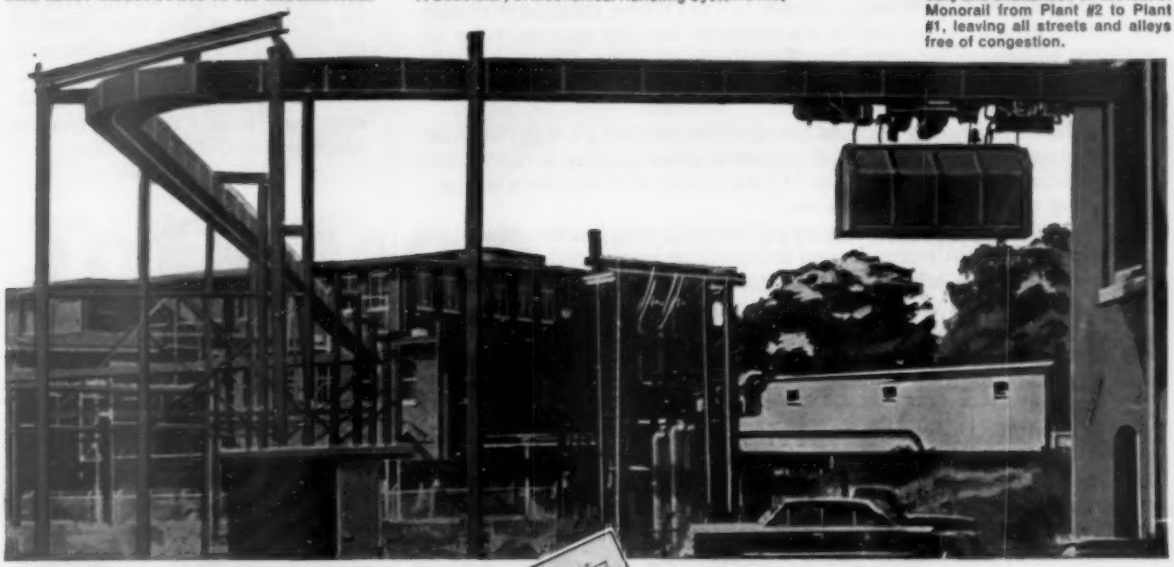


Operator loading carrier with two 650 pound beams of domestic print cloth prior to transport from loom room to cloth room.

Below:
Operator raising carrier into position, selecting destination by push button. Carrier automatically stops at desired destination.



Below:
Carrier completing trip automatically and unattended on 650 feet of Monorail from Plant #2 to Plant #1, leaving all streets and alleys free of congestion.



NEW. . . 52 pages of illustrated applications . . . industry by industry. Get the latest and most complete information on planning and equipment selection for the best in modern materials handling. Write today for your copy "COST-CUTTING WITH MONORAIL AND CRANES."

Louden
MONORAIL & CRANES

This Pannier Offset Bar and Tube Printer at the Superior Tube Company, Norristown, Pennsylvania, is shown marking tubing. The tubing moves from the marker right to a delivery table, ready to bundle for shipment.

MARK BARS, EXTRUSIONS AND TUBING QUICKLY, CLEARLY FOR EASY IDENTIFICATION

The Pannier Offset Bar and Tube Printer marks tubing clearly at a controlled rate of up to 450 feet per minute in a wide range of sizes. It is designed to handle rounds from ⅛″ O.D. to a maximum size of 14″ O.D. Simple adjustments compensate for the various sizes of material to be marked, including flats up to 4″ wide. Adjustable side guide rolls are available as optional equipment to permit printing on flat material from 4″ to 14″ wide.

Top surface printing permits constant inspection. Fast drying inks permit immediate handling. The standard offset printer is right-hand feed; left-hand feed is available to fit your conveyor line system without disrupting present line movements.

This unit (Model 8) will print a 24″ continuous legend; Model 12 will print a 36″ continuous legend using either premolded rubber dies or changeable type, which range in size from 1/16″ to 2½″ characters. Fast type setting saves valuable production time and speeds up deliveries. Printing components, which include the die wheel, printing wheel and drive wheel, are available in three sizes, depending on size of the characters desired. Printing components are quickly and easily interchanged.

The Pannier Offset Bar and Tube Printer is available with a ¾ horsepower variable speed motor, or is friction driven from your existing conveyor for continuous flow materials. The power unit has a magnetic starter that activates motor as material passes through the limit switch. This eliminates excessive ink build-up on the offset printing wheel, and assures clean, clear marking.

Pannier also has a small model Offset Wire Bar and Tube Printer, which is recommended for printing materials less than 4″ O.D. Pannier engineers will be glad to consult with you on all your marking problems. For complete information, write:

PANNIER MASTER MARKERS
201 Pannier Building
Pittsburgh 12, Pa.

MASTER PANNIER MARKERS

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

173—Mobile 4-Wheel Tool Bench has 22 interchangeable drawers that lock, and 24 small parts pockets. Won't tip; holds up to 1500-lb. load. Flat top may be used as workbench or to mount other equipment. Comes in 3 sizes, 4 standard colors. *Roll-On Mfg. Corp.*

174—Photoelectric Switch that turns outdoor light on or off costs 10 to 20% less than other units of this type. Uses no tubes. Choice of 12 mounting accessories for any installation including pendant and old-style solid head fixtures. *Precision Multiple Controls, Inc.*

175—Airless Spraying System has reciprocating 30:1 ratio pump that operates at 3000-psi. pressure. Handles materials which formerly could not be sprayed; has reserve power for heavy use. Accepts up to four manual or automatic guns. In 10 and 55 gal. sizes. *Spee-Flo. Co.*

Mr. S. E. Miller, Vice President and Division Manager of American Bosch Arma, shows the hundreds of items which go into the manufacture of a fuel injection pump (upper left of table).

IBM MOS

MANAGEMENT OPERATING SYSTEM SAVES AMERICAN BOSCH $120,000 YEARLY ON SHOP ORDERS ALONE

...TRIPLED SAVINGS ANTICIPATED WHEN SYSTEM IS EXPANDED!

American Bosch has turned to IBM's new systems techniques for faster, more sensitive control of its manufacturing cycle at the Springfield, Massachusetts, plant. Utilizing the IBM Ramac 305, the Management Operating System has been applied to Materials Planning and Inventory Management, and large savings have already accrued.

These additional savings are expected from methods now in use:

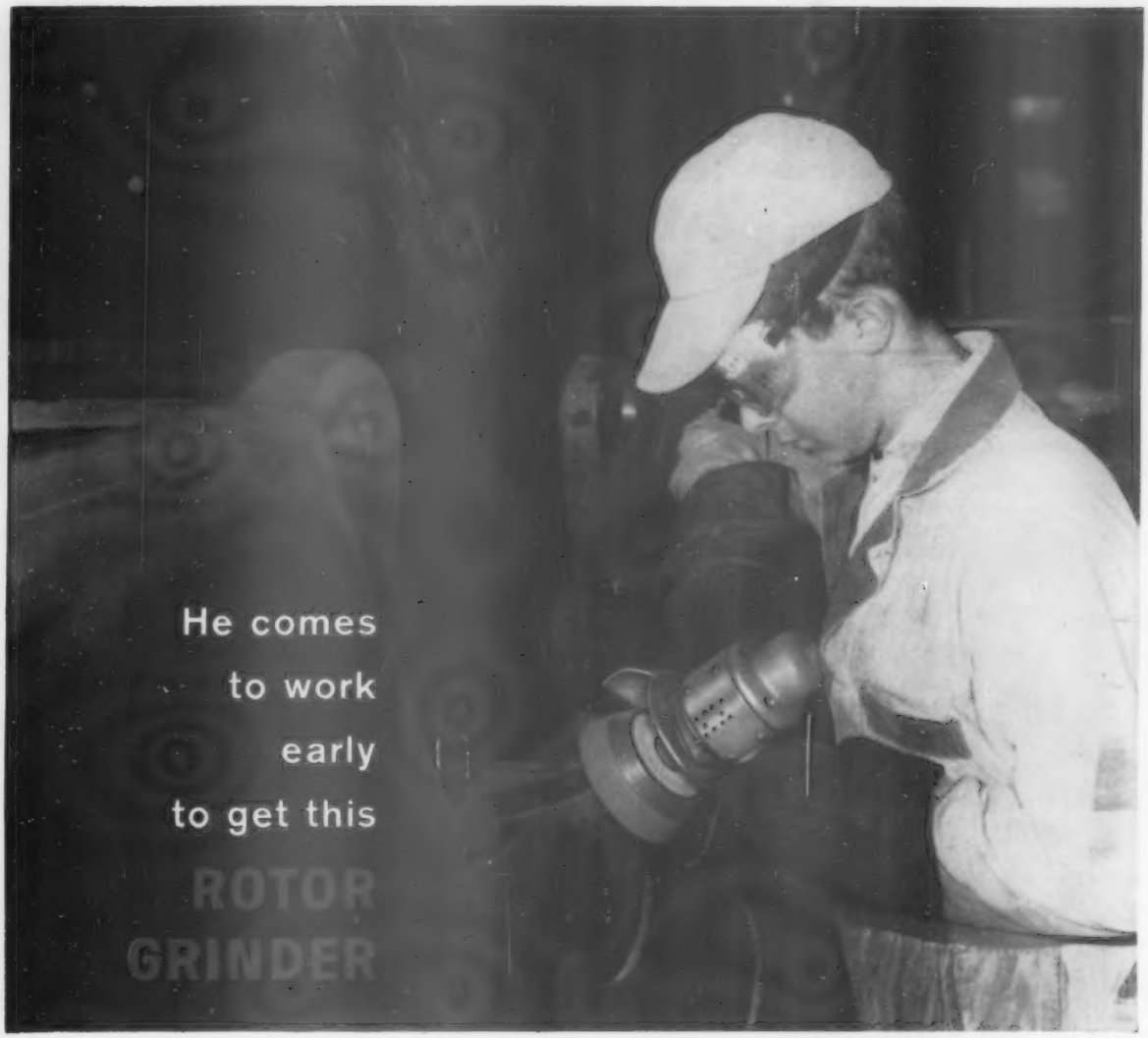
■ sharp reduction of machine setup costs. ■ standardized production levels, to minimize manpower fluctuations and concentrate inventory dollars on active sales items. ■ substantial time reduction in production schedule changes. ■ automation of annual standard cost revisions, with a 70% expense cut.

When the Management Operation System is extended to other areas, American Bosch estimates that savings will be tripled.

MOS can be applied to most industrial operations, with specially trained manufacturing representatives to assist you. IBM Balanced Data Processing provides comprehensive support in applying the system to your company's operation. For full information, call your nearest IBM office.

BALANCED DATA PROCESSING ▲ ® IBM

For more facts Circle 471 on Reader Service Card



Courtesy Thew Shovel Company, Lorain, Ohio

. . . IT'S LIGHTER

. . . MORE POWERFUL

. . . CUTS JOB TIME 40%

JOB: Grinding weldments for power shovels—welds in many positions. Conventional vertical air grinder is heavy—excessive speed drop under load.

Purchased Rotor M 1132 B-7S vertical air grinder (6000 rpm).

RESULTS: Lighter, more powerful grinder cuts job time 40%. Operator shown likes it so much better than other grinder, he comes in early to get it! Savings paid for this Rotor Tool in 10 weeks. *Ask for demonstration* of any Rotor Tool on *your* work to find out how *you* can save. No obligation.

Write for full-line Bulletin 56.

ROTOR TOOLS

The Rotor Tool Company · Cleveland, Ohio
SUBSIDIARY OF THE COOPER-BESSEMER CORPORATION

ROTOR AIR TOOLS: Assembly Tools • Drills • Small Wheel Grinders • Straight Grinders • Vertical Grinders • Scalers Chippers • Rammers • Special Tools • Air Motors • ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders

For more facts Circle 472 on Reader Service Card

FACTORY

PLANT OPERATIONS CASE BOOK

COLOR CHANGES take seconds with snap-on paint gun at Ford

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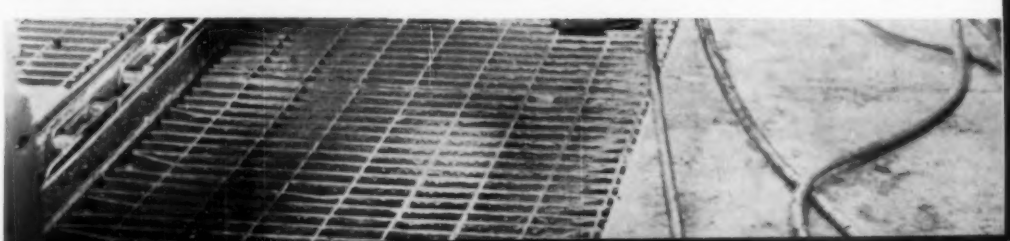

FACTORY CASE BOOK

NORMAN H. SOLON, EDITOR

No. 37 November 1960

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AIR DISPERSAL SYSTEM

HANGING AIR CONDITIONERS

Full of hot air? Not this computer

Feeding cool dry air into a giant computer wasn't easy at Crouse-Hinds Company, Syracuse, N.Y.

For one thing air ducts couldn't be installed in the room because the ceilings were too low. For another the computer generated 70,000 Btu. per hour, and temperatures dropped rapidly when it was idle. Paper dust in the air from nearby card punching machines created a third problem.

The solution lay in literally surrounding the computer with air conditioning. Here's how it was done:

A 15-ton air conditioning unit (right photo) was suspended from the ceiling of the room below—directly beneath the computer. The unit is capable of handling 6000 cfm. of air. Grills beneath the computer feed part of the conditioned air directly from the air conditioner into the RAMAC (IBM Corporation, Poughkeepsie, N.Y.).

In the computer room, two plenums (left photo) with grills on all four sides, disperse air throughout the room. Behind the RAMAC a return air grille receives air from both the room and computer. An electrostatic filter traps the dust. Two 7½ ton condensing units are installed on the roof of the building. Refrigerant lines run through the plenums, connecting these units to the air handling equipment. No need to cut additional holes in the floor for the piping.

The air conditioning equipment was manufactured by Carrier Corporation, Syracuse, N.Y.

Results: A constant temperature of 74 F. is maintained in the room, and a humidifier keeps the relative humidity between 46% and 52%. A red bulb lights up if the humidity drops below 39% and another if it climbs to 58%. A third signal lights up if the temperature rises above 82 degrees.

Setting you straight on work measurement

Do you have qualms about installing a maintenance work measurement program in your plant? You may be missing a good bet through misconceptions.

Robert S. Smith, management consultant for A. T. Kearney & Company, answers ten typical objections to installing such a program.

1. My maintenance department is too small.

A. You don't need a giant 500-man maintenance crew to install work measurement. Don't base your decision on the number of men on the payroll. In all probability the simplest plan would mean a reduction of one or two men in a ten-man maintenance crew. This is a savings of 10 to 20%.

2. It can't be done—maintenance work is too complex and varied.

A. It's being done. Just find the yardstick that suits your particular need. There's a multitude of measurement systems open to you. They range from established standards based on historical data to the use of predetermined standards developed by time study. If you choose the latter, "library" information for most types of maintenance work can be obtained without the need for a costly time study program.

3. Too much paper work—it makes clerks out of foremen.

A. Hire clerical help if needed. Administrative costs won't run over five or six percent of the payroll for the men under measurement. Anyway, paper work need not be excessive. In many cases it is actually reduced.

4. Who needs it? We can get just as good results by improving our administrative and operating practices.

A. Can you? If you're walking to the station, you can cut the time down by walking faster. But you'll get there a good deal quicker by automobile. It's the same principle.

5. Work measurement costs too much to install and operate.

A. Not on the basis of probable return on investment. Get rid of the idea that adding to overhead payroll is necessarily bad business. Advanced mechanization smashes the theory of a fixed ratio of overhead to direct labor. It's the return that counts.

6. Maintenance men are expected to use more individual judgment than production workers. This variable is hard to measure.

A. But the variable is being measured successfully. And in the majority of cases its shows that the maintenance worker is being given far too much leeway.

7. Even if the data show we have been using labor ineffectively, what can we do? Contractual restrictions prevent us from reducing our force.

A. The force can be slashed by not replacing workers that leave. And transfers can be arranged for mutual benefit.

8. Our maintenance problems are different than others. Therefore standards developed in other plants won't apply.

A. Why not? It doesn't take your pipefitter any longer to cut, thread and make up two-inch pipes than the man across the street. The exception might be on infrequent repair of specialized production equipment. Some time study may be required in that case.

9. We've talked to other companies that have tried work measurement and are not happy with the results.

A. Who did you talk to—the plant engineer. Maybe he wasn't properly sold, and resents this supposed encroachment on his authority. Or perhaps the work measurement program was poorly administered. Many use it and are thoroughly sold on it.

10. I'm sold—but how do you sell the big boys upstairs.

A. A proper presentation of the cost and estimated savings will do the trick in most cases. Few managements will turn down an opportunity to reduce operating costs.

Source: Robert S. Smith, management consultant, A. T. Kearney & Company, Chicago.

Snap-on spray gun turns job colorful

(Cover Story)

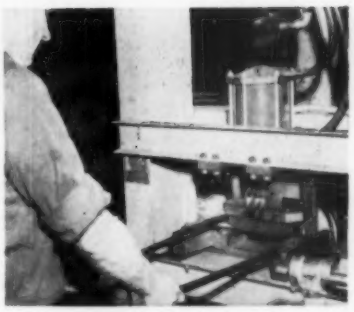
This worker is spraying white paint at Ford Motor Company's St. Paul, Minn. plant. And the next car on the line is due for a green coat. There's no problem however. He can do both jobs with the same spray gun, without the colors mixing. And no time wasted either. The snap-on spray gun does the trick.

The snake like lines at the right are connected to paint tanks in another section of the plant. There are normally 21 lines representing Ford's standard colors, plus six or seven for special orders.

To go from one color to another, the painter just snaps his spray gun from the paint line he's using and connects it to the line he needs. It doesn't take more than a few seconds.

This idea can be adapted by any plant faced with the problem of applying several colors on a high-production basis.

The spray guns are made by Binks Manufacturing Company, Chicago.



Air rig saves both money and hands

This plant-made air rig, used for bowing steel tubes, is reaping dual benefits at Hampdem Speciality Products Corporation, Easthampton, Mass. It eliminates the need for purchasing an expensive press for the operation. And it keeps the operator's hands safely away from the moving part of the machine.

All the operator has to do is insert the U-shaped tubes. The machine automatically clamps down, performing the operation.

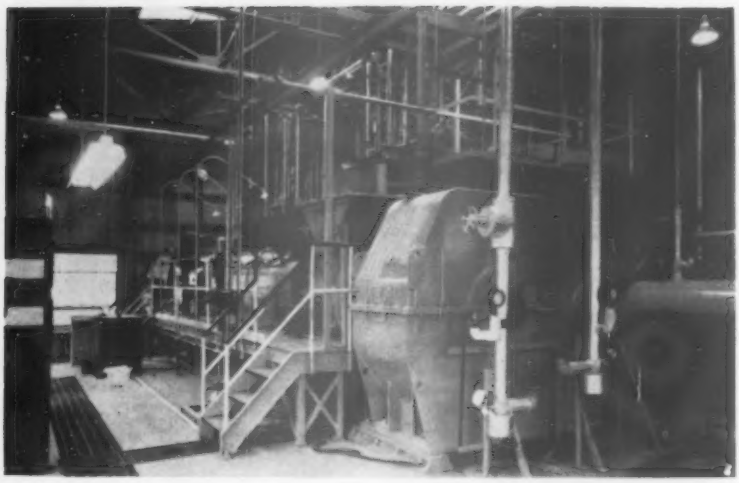
It would be ten times more expensive to purchase a press to do the job. And operating time would be considerably slower.

Long life bins

Repair costs for small-parts shipping bins have been slashed by 85% at Western Auto Supply Company's Butler, Pa. warehouse. Reason: Replacement of canvas wire hampers with fiber-armored receptacles.

These bins (National Vulcanized Fibre Company, Wilmington, Del.) cost about $250 a year for maintenance. This is a net savings of $1750 over the old system.

The plywood-fiber bins resist battery acid in addition to greases and solvents. They can be wiped clean without damage. Storage is easy as the bins can be stacked one on top of the other.



GIANT DRYER PUTS THE SQUEEZE ON MOISTURE

This mammoth 50-ton extrusion dryer squeezes moisture out of three to four tons of synthetic rubber every hour at the Institute, W. Va. plant of Goodrich-Gulf Chemicals, Inc. And the dried polymer is free of ash. The conventional three-pass hot air dryer is slow, requires extensive maintenance, leaves the dried rubber with a relatively high ash content, and the drying cycle averages around an hour and a half. With the new machine it takes just five to ten minutes. The 40-ft. long unit (National Rubber Machinery Company, Akron, O.) is powered by an 800 hp. induction motor, coupled through a clutch to a transmission.

Infra-red bakes four times faster

It's not exactly new, but here's another example of an infra-red oven doing a better job than its steam-heat counterpart.

By converting a drying oven to infra-red, the conveyor flow was stepped up from two to eight feet per minute at General Electric Company's Rome (Ga.) plant.

Formerly the small parts oven used steam heat, that dried by convection. This gave parts a dried-enamel finish. Now the oven is heated by radiation from quartz infra-red lamps. Each of the 45 quartz lamps is a 1000 watt unit.

The new system dries parts to an almost chipless finish that is more durable than the dried enamel finish.

Replacement Plan keeps eye on budget

"We need new machines, but we can't wreck our budget to pay for them." If that's the alibi for obsolete equipment in your plant, try this idea on for size. Morse Twist Drill & Machine Co., a division of Van Norman Industries (New Bedford, Mass.) has instituted a two-phase system to methodically replace most of its production machinery.

Phase one covers standard machines. Phase two, special equipment.

Standard Machines:

Back in 1956, Morse found itself operating lathes, milling machines and grinders, some 50 years old or more. The time was right for changes.

The plant engineer made a survey of all equipment. He checked age and operating conditions, noting all the machines that would have to be replaced over the next five years. Some 600 machines fell into this category. Once the program was approved, total replacement costs were calculated. And a special appropriation, independent of the company's regular budget, was alloted for the replacement of these machines. It was pro-rated over a 5 year period. This year $300,000 to $350,000 will be spent for new equipment.

Foremen and superintendents annually compile a list of standard equipment needed in their departments within the coming 12 months. The chief industrial engineer refines the list and attaches dollar values to the proposed replacements. The plant manager further revises the list and attaches priorities to each piece of equipment. Priority is based on need, rate of return and quality of product.

The proposed list then is examined by the parent company's vice president of manufacturing and the board of directors. Here, an appropriation is set aside to purchase the machines.

At this point industrial engineering department members who originally compiled the list make out a "request for authorization of capital expenditure." They work closely with the purchasing department in studying proposals and estimates from machine vendors. After deciding on specific machines they submit reasons to support their choices, together with a comparison of unit costs (per product) using old and new machines. Corporate management then approves this "request for authorization" with the final o.k. coming from the division's president. The machines are paid for from the blanket appropriation.

By the end of next year (which will complete this 5 year program) most of the old lathes, millers, thread grinders, and automatic screw machines will have been replaced. If all goes as planned, most belt driven machines will be eliminated. And the average age of the machinery

will have been lowered to between 5 and 10 years, and obsolete equipment will be eliminated.

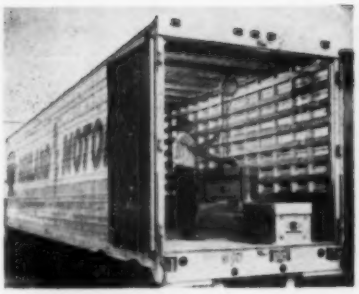
Specialized Machines:

Since this equipment is subject to more accelerated wear, a five year replacement plan is impractical. Instead, an annual survey is made to determine replacement, with costs coming out of the regular budget. Each machine is checked to see if obsolescence and breakdown is raising the cost of operation excessively.

A complete machine breakdown would seriously hamper production. And, of course, there is no duplicate equipment on hand due to high initial costs (from $15,000 to $30,000). Furthermore, this special equipment usually operates on a multi-machine load. Thus, machines found to be operating as a risk are programmed for replacement. This year, it is estimated that from $150,000 to $200,000 will be spent at Morse for this special equipment.

Giving muscles to steel

A new process, which gives carbon steel many of the properties of stainless steel, has been developed by Alloy Surfaces Company, Wilmington, Del. A licensing arrangement has been worked out with several companies for the use of the Alphatizing process. It increases the resistance to heat, corrosion, wear.



A gentle lift

Loading heavy motors to be shipped between plants is a cinch at Reuland Electric Company, Alhambra, Calif. This hand hoist mounted in the van does the trick.

Previously the motors were lifted manually. This fatiguing job took 16 man hours. With the crane it only takes an hour and a half.

The small crane (Chisholm-Moore, Tonawanda, N.Y., a division of Columbus McKennon Chain Corporation) runs of wheels along a three inch aluminum alloy channel. This is constructed on the sides of the truck. Small rollers keep the crane squared.

A ¼-ton capacity trolley and hand hoist are mounted on the crane. They can move both crosswise and along the entire length of the trailer. The crane can be easily locked while traveling by anchoring the hoist hook to the side of the van with a thumb-turning stop.

HERE'S A NEW USE FOR LAWN TRACTORS

When the upper floors of an old multi-story factory building can't take the weight of a standard lift truck, materials handling can be quite a headache. This trackless train, pulled by a converted lawn tractor solved the problem at Hampden Specialty Products Corporation, Easthampton, Mass. The tractor cost just $450, much less than a lift truck. It can handle a capacity of 5000 pounds spread over the six carts. Formerly heavy boxes had to be lugged manually.

CASE BOOK CAPSULES

Precision ball bearings that will operate at temperatures up to 575 F. without lubrication, have been devised by Barden Corp., Danbury, Conn. Former heat limit was approximately 300 F.

A programing system that uses English words rather than numerical equations to instruct an electronic computer has been developed by Radio Corporation of America, New York.

Tensile strength of materials at temperatures approaching absolute zero can be determined through the use of a new type refrigerator, developed by Arthur D. Little, Inc., Cambridge, Mass.

Sulfur-hungry bacteria may be the answer to bad odors from smoke stacks of industrial plants, a Department of the Interior official reported to the American Chemical Society in New York. The bacteria can oxidize material containing sulfur 13 times faster than air.

A leasing arrangement for dirt and dust control equipment based on actual savings to the customer, has been worked out by CRS Industries Inc., Philadelphia.

Flat rectangular fluorescent lighting will soon be on the market by Westinghouse Electric Company, Bloomfield, N.J. The 12-square inch models will be 40 to 50 watt lamps. And can produce considerably more light than a 100 watt incandescent bulb.

Nuclear energy in the near future may turn inexpensive liquid ammonia directly into hydrazine, a valuable space age fuel, according to Aerojet-General Corporation, Los Angeles, Calif.

An inflatable rubber airplane, weighing only 200 pounds, is being tested by Goodyear Aviation Company, Akron. It can fly at an altitude of 8000 feet at speeds up to 70 knots, and can land in a space shorter than a football field.

ROBOT BRAIN PUSHES NO PANIC

"Did you hear about the electric brain they're installing? It's gonna put half of us out of work."

Rumors like this spread like wildfire when workers get the word (through the grapevine) that a company plans to install automatic equipment. Result: a ready made morale problem. This problem was especially acute at Miniature Precision Bearings Inc., Keene, N.H. The company ordered a Transactor data collection system (Stromberg Division of General Time Corporation, Thomaston, Conn.) last January. It was to be used, initially, to clock out employees. Workers report their time on the job and the amount of work accomplished by punching a machine right at work stations. The data is then remotely fed into a central computer. Since the company previously had no time control system of any sort, initial reaction by the workers was—to put it mildly—unfavorable.

However, the company had six months from the time of order to the installation date in which to dispel the worker's fears. Here's the program they followed to make allies instead of enemies out of their employees:

JANUARY • A management team composed of top representatives of various departments including production control, data processing, cost accounting, industrial engineering, training, and public relations was organized. They told the company's story to workers in their own department. Personal benefits were stressed. Hourly shop workers for

BUTTON

example, were told that the system would eliminate some clerical tasks. Most important they were guaranteed that no one would lose their job because of the new machine.

FEBRUARY • Supervisors received a rundown on the overall operation of the transaction. False rumors were dispelled and supervisors were told the advantages of the Transactor in the performance of their jobs. They also assisted in development of a training program for workers, and in writing operational procedures.

MARCH • A brochure was distributed pointing out that the Transactor, rather than being a job threat, helped job security by giving the company a competitive advantage.

Members of the management team worked with supervisors in preparing for the new system.

APRIL • Transactor units were demonstrated to all department heads even though some sections would not be using the new system.

MAY • Dummy Transactor units were used for demonstration purposes. Supervisors instituted a training program for workers. The latter were reassured that the machine would not mean layoffs.

JUNE • The system was installed without a hitch. Within three days after the first units were installed, reporting errors were down to next to nothing.

Little grumbling was heard from the workers and the general feeling of uneasiness that prevailed when the move was first announced had completely vanished.

For more on data control systems see Controlled Plant Information (FACTORY August 1960).

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

SUCTION CUPS GIVE GLASS A LIFT

Suction cups, plus a specially fabricated boom, make half-ton glass plates a cinch to transport by lift truck. Toledo Plate and Glass Company, Toledo, used them during a recent installation job. The glass sections each measured 70 by 233 inches. The glass was transported to the construction site by motor truck. Then a lift truck (Hyster Company, Portland, Ore.) unloaded each plate, carried it to the window opening and set it in place. The suction frame and mask can be easily rotated manually from a horizontal to vertical position and back.

Keeping an eye on the hot spots

Just a glance gives the operator a temperature check of 11 key spots of a plastic coating mill at Reynolds Metals Company, Harrison, N. J. This recording potentiometer chart tells the story.

The potentiometer records temperature data from 11 thermocouples at critical points in the extrusion section of the mill. And temperature is a critical factor in the operation. Each point is successively registered on the slow moving chart, allowing the operator to make periodic checks. And it also leaves a permanent record of temperatures required for a particular job. When that job is repeated the operator merely has to refer back to the chart to adjust the temperature settings of the machine.

At the same time, the potentiometer also records two additional variables. The rolling speed of the mill (in feet per minute) and turns of the plastic extruder screw (in revolutions per minute).

The recording device is manufactured by Weston Instruments division (Poughkeepsie, N.Y.) of Daystrom, Inc.

YOU BE THE ARBITRATOR

The Reluctant Janitor

Out of the experience of American Arbitration Association

The foreman of a metal door manufacturing company found himself short-handed. He wanted some grease pits cleaned up under a few of the machines. But the general helpers who usually did that kind of work were on vacation, so he ordered Al S., a janitor to do it. Al and the union objected.

"That's not within the janitor's duties," argued the shop steward. "If you want him to take on additional assignments of this kind you have to negotiate a new rate for his job."

"No we don't," answered the plant manager. "General unskilled work is already part of the janitor's job. The job definition reads"

"Janitor: Performs various duties in accordance with an established routine or as ordered by foreman. Dusts and cleans offices, dispensaries and shop areas, empties waste baskets, cleans lavatories and drinking fountains, sweeps and scrubs floors and stairways. May do unskilled jobs as required."

The chief issue was whether the last sentence, referring to "other jobs as required", covered the work the foreman ordered Al to do. Eventually, the dispute went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 172

Airborne barrels

There's no need for a muscle man to lug barrels on and off fork trucks at Multifasteners Corporation, Cleveland. This barrel lifter does the job for him, and the driver never has to leave his truck.

The company handles hundreds of thousands of small parts daily, most of them requiring heat treatment before packaging. This calls for the handling of a multitude of barrels, both for treatment and in transit. Thus this hand device speeds handling considerably.

The device (Ironrite Corporation, Providence, R.I.) has only two moving parts. And it easily slips on and off any standard fork truck. It will handle any size drum, keg, barrel or any other container that has a lipped edge.

Cleaning up the air protects motor

Maintenance costs have been chopped in half for a 500 hp. mixer motor and a 50 hp. mill drive motor at General Tire and Rubber Company's Waco, Texas, plant. Key: Allowing only clean air to cool them. To accomplish this, the motors were shrouded and provided with a closed cycle of clean, cooling air. A special filtering unit does the trick.

The air entering the motor first passes through a cloth, tube-type air filter (Wheelabrator Corporation, Mishawaka, Ind.). Then it's ducted to the motors under slight pressure. (This prevents dust from entering the motor in case there is a small leak.)

For safety, a pressure switch inside the duct is connected in series with the control circuit. This means that the motor will not start until proper ventilation is supplied. The switch will automatically cut off the motor in case of a failure of the ventilation system.

DECEMBER CASE BOOK

There's no need for manual touch-up after folding chairs are electrostatically painted at Hampden Specialty Products. A plant-made supplementary paint booth does the trick—faster.

Stretching storage space way out

This lift truck can almost stack pallets from around the corner. Result: An additional 36.8% storage space at Glidden Company's Reading, Pa. plant.

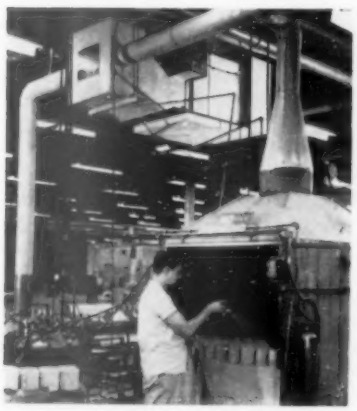
The truck (Towmotor Corporation, Cleveland, Ohio) has a hydraulically operated front end assembly with a pivot section that can turn halfway around. This means pallets can be stacked 90 deg. to the right or left. Previously the company needed aisles with a width of 9 ft. 6 in.—to accommodate conventional lift trucks. Now only 6 ft. aisles are required.

Inventory capacity has been increased by 42% by stacking 1650 pallets in tiers up to 14 ft. high. Under the old system only 1160 pallets could be accommodated in the same space.

The new truck handles loads up to 1 ton.

THESE WORKERS ARE HANDICAPPED—BUT NOT THEIR WORK

This assembly line of handicapped persons is proving an excellent source of labor supply in the Wilmington, Del. area. It's run by Opportunity Center, Inc., a federal government subsidized business supported non-profit organization. Workers are mentally retarded or multiple sclerosis victims. The center, which receives contract work from the business community, trains the handicapped for jobs commensurate with their handicaps. Working hours and conditions parallel industry's. Only wages differ. And on contract work, piece rates are equal to that which the customer would pay its own workers. Local businesses are encouraged to hire these workers. Last year 21 were employed.



Handcuffing oil

Tiny oil particles no longer form a mist on electrical fixtures, ceiling, and machinery at Air Maze Corporation, Cleveland. This electrostatic oil mist eliminator keeps oil out of the air.

In the past, oil used in spraying products had been partially controlled with a glass wool filter. However, microscopic oil particles, measuring about a tenth of a micron, escaped to the air causing the damage. The minute particles also constituted a health hazard.

Now the electrostatic unit ionizes the oil particles. Then it collects them magnetically on a series of alternately charged negative and positive aluminum plates. It can handle up to 2400 cfm. efficiently.

Used in conjunction with the glass wool filter panel and suction fan, the oil is kept recirculating, with no danger of escaping oil mist.

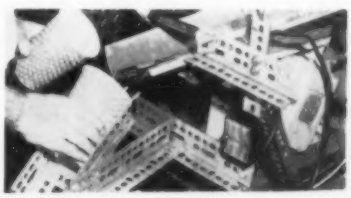
Workers write safety rules

Machine operators will sometimes scoff at the most elaborate company safety slogans and regulations. But they are far less likely to ignore their own handiwork. That premise is the heart of the safety program at Behr-Manning Company, division of Norton Company, Troy, N. Y.

Operators actually write safety rules for their machine and job. Here's how it works:

During departmental safety meetings, operators of each type of machine were asked for their ideas concerning job hazards and accident prevention. These were written down and forwarded to the company safety department. The suggestions were incorporated with those submittted by operators from all shifts, and made into a rule sheet for each machine.

Before the rules were finally established, however, they were submitted back to the foreman and individual machine operators for final revision and acceptance.



Falling uphill

Disobeying the law of gravity has these results at Tacony File & Hardware Company, Philadelphia. Files are unscrambled and degreased at the same time. A vibratory feeder (Eriez Manufacturing Company, Erie, Pa.) does the trick.

Files coming from an oil quench operation are shaken uphill in a vibratory feeder. A solvent spray above the feeder hits the files. While the vibration causes the files to unscramble and continue up the 10 deg. incline, the liquid solution falls back along the decline. The degreasing solution flows out of a series of perforations at the bottom of the incline.

Formerly, the files had to be degreased and unscrambled manually. This was time-consuming and unsafe, because of the risk of cuts.

Getting down to cases on safety

Plant management men and union leaders attending an annual West Coast safety conference have a chance to put their latent Dick Tracy talents to work. The parley, sponsored by the Pacific Coast Association of Pulp and Paper Manufacturers, a trade group of converters, has all the elements of a good mystery story.

Actual plant accidents are given names—right out of a Perry Mason novel—and outlined to the audience by means of slides. Then the participants discuss the conditions leading to the accident, and what steps could be taken to alleviate the situation. Later they compare their solutions to what actually was done in the plant.

However, these are not merely academic discussions. The cases are not freaks—but illustrate very real accident hazards. In the 14 years since the joint management-labor conferences have been instituted, accident rates in association plants have dropped 87% say officials.

Here are two typical cases:

The case of the binding rings

Charley P. and another employee were moving a heavy cabinet into a corner of the plant. The cabinet slipped and pinned Charley's hand against the wall. His wedding band collapsed against his finger. It immediately turned blue, due to loss of circulation.

Villain: The ring. It should never have been worn to work.

Solution: Safety posters were placed around the plant. They emphasized apparel and accessories that should—and should not—be worn on the job.

The case of the footloose wrench

Bill D., a machine tender, had to make an adjustment on a second machine underneath his regular work station. He left his tools right where they were at the time, figuring he'd be gone only a few moments. The photo tells the story. Another worker crossed the catwalk above his head, kicked a wrench over the side. It struck Bill on the head.

Villain: Sloppy work habits.

Solution: Emphasize the need for on-the-job housekeeping, such as putting tools in racks. Have the plant safety committee make frequent checks to insure compliance.

Epoxy takes a load off the floors

An epoxy surfacing treatment has increased the compressive strength of a concrete floor from 4000 to 20,000 psi. at Trans World Airlines Corporation's maintenance base, Kansas City, Mo.

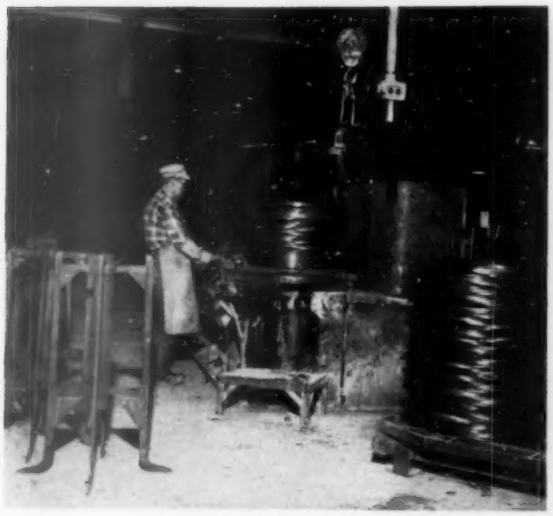
Giant engines in the past played havoc with the floors. They created pressures of 10,000 to 15,000 psi., and rapidly created severe high and low spots.

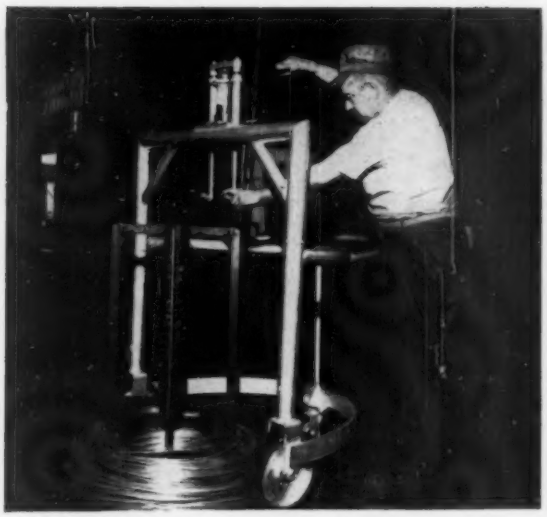
The solution: An epoxy treatment. A 400-square-foot section of the floor which received the worst wear from the engines was chipped down to solid concrete. Then a coat of mixed epoxy resin (Union Carbide Plastics Company division of Union Carbide Corporation, New York), hardener and fine flint sand was troweled on. The coat varied in thickness from ⅛ to two inches. No heating operation was necessary. The curing took place at room temperature.

Light traffic was allowed after one day, and normal operations after 72 hours.

Cost for the operation: $4400.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.





COLLAPSIBLE PLATFORM GIVES STEEL WIRE THE RUN-AROUND

Steel wire is now processed from drawing block to shipping dock in half the time at Atlantic Steel Company, Atlanta, Ga. Reason: This plant-made collapsible platform (left photo) that can twist a ton of wire around itself.

Formerly, wire came off the drawing block in loose 600 pound coils. A series of handling, cutting, and tieing operations were required before the wire was ready for shipment. And in storage the coils could not be stacked on top of each other without danger of flattening.

Now the platform is placed on the drawing board . The wire coils around it. The loaded platform is lifted by crane to a pallet, weighed and put on a carrier. From there it either is sent to the shipping dock or into storage. The coils can be stacked three deep in storage.

For in-plant handling, a one man dolly (right photo) was constructed. It has three ball-bearing wheels. The back one is small enough to allow a 360-deg. turn. No trouble maneuvering in tiny spaces. A hydraulic jack lifts the coils.

Foremen's shirts spell out quality

These "quality always" shirts give workers one more reminder of the need for perfect work. They're worn by foremen at Edward Valves, Inc. (East Chicago, Ind.) subsidiary of Rockwell Manufacturing Company. And supplement posters and signs stressing quality throughout the plant.

The shirts also have a prestige value to the foreman. As such, they're a morale booster. And finally, they make it easier to locate foremen anywhere in the manufacturing area. Shirts are made by Brown Uniform Company, Chicago.

Election low down

Employees at Ford Motor Company received an eleventh hour rundown of candidates and issues in both the national and local elections. A voter's guide with this data was issued late last month.

The voter's guide was an eight page insert in all of Ford's house organs throughout the country. The guides were different for each plant. However, each contained an open letter from both Senator Kennedy and Vice President Nixon, stating their positions. Biographical sketches of both men were also included. In addition area house organs gave information about candidates for local offices.

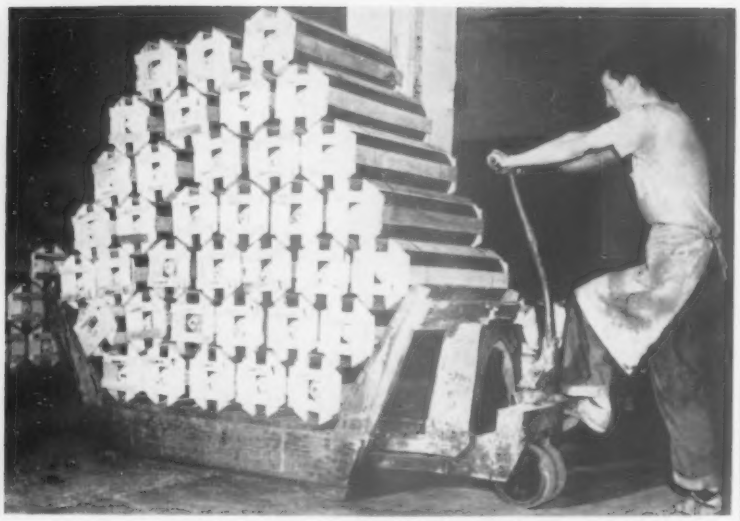
Differences between G.O.P. and Democratic platforms were discussed objectively. Ford took no position on candidates or issues.

Xmas tree rack

This Christmas tree chain rack makes cutting and handling of drive chains a snap at Ohio Gear Company, Cleveland. The chain reels rotate easily on the six ft. rack, eliminating the need for any muscle work.

Formerly, heavy wooden spools were used. This meant that every time the chain was needed, workers had to lug the spools—either manually, or by dolly or hoist—into position for the cut off. Then wrestle with it to draw off the required length of chain.

It takes about a minute to obtain needed chain with the Christmas tree arrangement. Under the old system it took as long as 15 minutes.



CUSTOM-MADE SKIDS MAKE HANDLING A CINCH

When a conventional skid just won't do the job you can always design one yourself—and have your local lumber company build it. This special skid, designed by Ohio Brass Company, Barberton, Ohio, makes it easy to move 36 hexagonal porcelain insulators from crating to shipping. Gross weight: 2700 pounds. The skid was built of hardwood by the Gilbert Lumber Company, Smithville, Ohio.

Keeping tabs on concentrate ratio

Quality control is a robot function at Schweppes Ltd., Hendon, England. This measuring machine automatically takes periodic samples of liquid from the production line and tests it for water-concentrate level.

This is done by titrating the water to a pre-set end point and providing a continuous graphic record of the ratio. An occasional glance tells the inspector of changes in the concentrate.

The analyzer consists of two cabinets hermetically sealed. At right is sampling and titrating apparatus and at left is the recording equipment.

The machine is sold by Milton Roy Company, Philadelphia.

How does your safety program stack up?

Supervisor safety training can usually stand improving in any plant, believes James F. VanNamee, executive at Westinghouse Electric Corporation, Bloomfield, N. J.

How can you tell if your current safety training program is doing the job? Here are four yardsticks set up by VanNamee to measure the success of any safety training undertaking.

1. Has there been improvement in the safety attitude and safety record of employees in departments where supervisors have been trained?

2. Has positive action been taken in removing safety hazards in these departments?

3. Have the trained supervisors accepted accident prevention responsibility without prodding?

4. Has there been voluntary development of safe methods and procedures?

YOU BE THE ARBITRATOR

Continued from page 168

The award—The arbitrator said: "The janitor job description defines a custodial job. The language 'may do other jobs as required' must be read in this context. The other unskilled jobs must be part of a job function which is related to the appearance or sanitary condition of the establishment." He concluded that cleaning grease-pits under machines, which had always been done by maintenance laborers, was not part of Al's job.

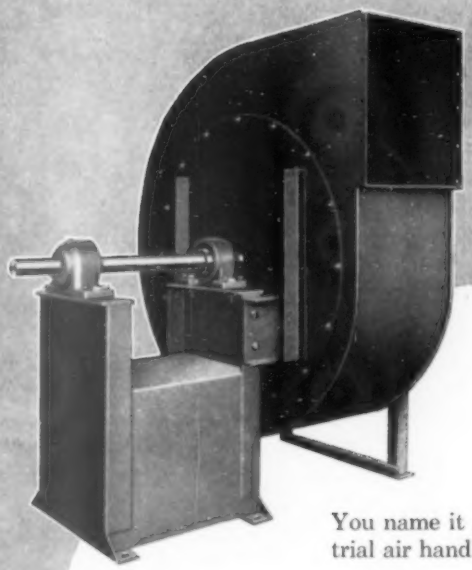
Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony and other facts involved.

TEN TON CRANE HOOK

This ten-foot-high crane hook recently installed at General Electric Company is said to be the largest in the world. Manufactured by Milwaukee Crane Division of Novo Industrial Corporation, the hook is used for handling rotors.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

How does industry rate CLARAGE?



EXAMPLE:
Over 1000 Clarage fans of this type are serving one manufacturer alone.

RE-ORDERS . . . RE-ORDERS . . . RE-ORDERS

You name it . . . Clarage has it for virtually any industrial air handling assignment.

Take the Type XL Fan shown. It's built in 16 sizes and four arrangements for volumes to 130,000 CFM, temperatures to 1000°F., pressures to 18". AMCA Certified Rating Seal applies to the three different wheels available —open, rim, and backplate types.

In the Clarage tradition of heavier duty construction, here is *quality* equipment assuring better results over a longer period of service. No wonder all 100 of America's 100 largest industrial corporations are Clarage users. If you too are after air handling and conditioning equipment that has what it takes—in every respect—contact our nearest sales engineering office.

Dependable equipment for making air your servant

CLARAGE FAN COMPANY

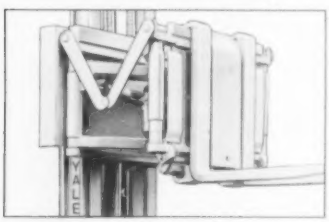
Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

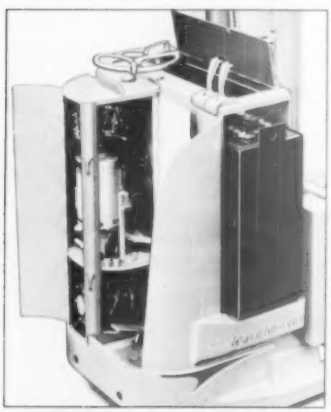
save space
you can't afford to waste

YALE WAREHOUSERS

Control grouping saves time by permitting operator to lift or lower while travelling. Direction indicator in steering wheel hub shows drive wheel direction, saves effort in cramped quarters, prevents stalling. Hour meter checks operating time, ton-hour handling costs, permits maintenance based on running time.



An exclusive separate motor and hydraulic system in the Extend-A-Load for fork extension and tilt increases efficiency . . . saving power. Unitized design gives maximum maintenance accessibility. Exclusive, interlocking I-beam mast gives greater strength and stability. Mast and carriage ride on large ball-bearing rollers.



Operational maintenance is easier. Maximum accessibility to components without sacrifice of chassis strength and rigidity. Immediate access to battery for inspection. Easy battery removal.

• Get more pallet rows in the same space • Can work in a 6 ft. aisle • Stack to 20 feet and more • Save on low maintenance • Reduce power costs • 2000, 3000, 4000 lb. capacity.

You get greater power in less space with the 24-volt Yale Warehouser. More efficient use of power for increased work capacity. Faster lift and sustained high-speed travel.

The Yale Extend-A-Load model handles various widths of loads because different size pallets and skid bins can be handled without nesting between outriggers. Maintenance is easier and power is conserved by Yale's exclusive separate power unit for fork extension. Extend-retract device designed for low overall height to prevent robbing you of valuable space in high stacking. Forks can be tilted back to 6 degrees to protect load and speed operations. They can be extended, retracted or tilted at any height of lift. Twin tilt cylinders eliminate sway of forks—provide load stability.

Start saving now. Yale has a finance plan that will put this truck to work for you immediately. For more information, contact your Yale Representative, or write to: The Yale & Towne Manufacturing Company, Materials Handling Division, Philadelphia 15, Pa. Dept. R-005.

Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., Forrest City, Ark. Products: Gasoline, Electric, Diesel, and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air, and Electric Hoists

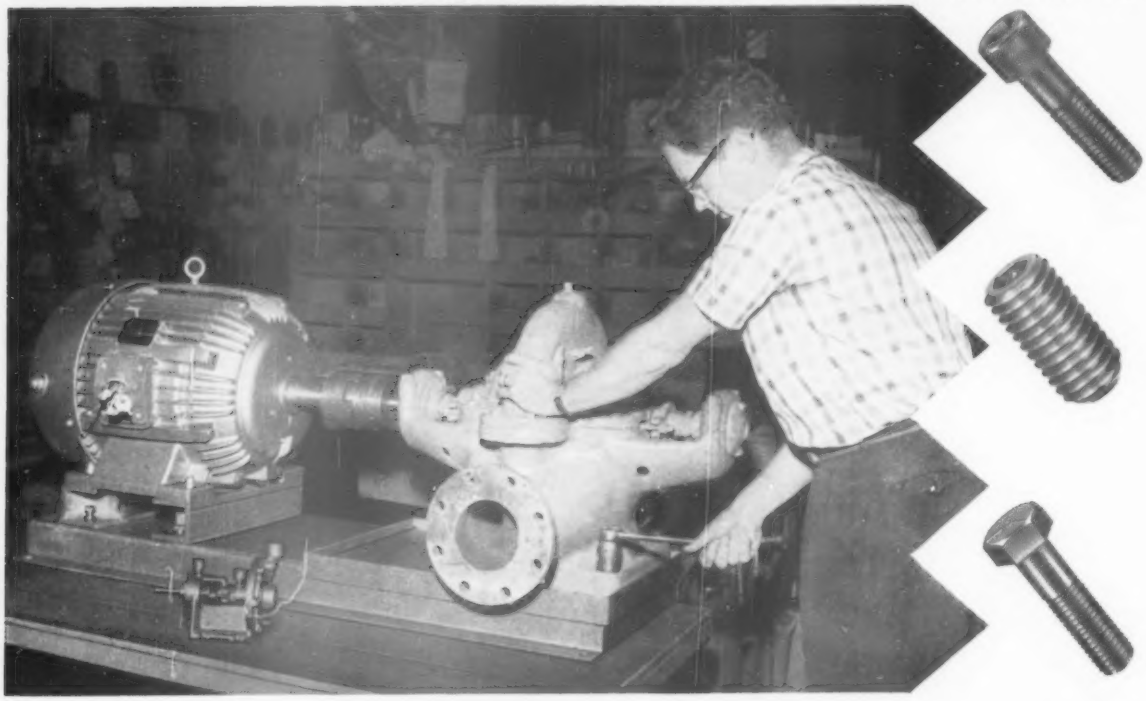
YALE

INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS · HOISTS

YALE & TOWNE

Save space where space costs most—cold storage operations. How much does your space cost?

IT PAYS TO STANDARDIZE ON STANSCREW



Stanscrew service, complete selection save trouble, money for Deming Pumps

The Deming Company of Salem, Ohio has stringent requirements for fasteners. They must be of the highest quality to maintain Deming's outstanding reputation for dependability and low maintenance. And, since Deming produces the world's broadest selection of pumps for home, farm, municipalities and industry, they need a fastener supplier with a complete selection to meet a wide range of applications.

Using Stanscrew products and services, Deming fills these demanding requirements and receives many bonus benefits. For example, the Stanscrew fastener specialist and their Stanscrew distributor have provided technical assistance and stocking suggestions which have allowed Deming to reduce inventory in several instances, for significant savings.

Industrial leaders in every phase of industry are learning the wisdom of specifying Stanscrew for fasteners. A complete selection of over 5500 different types and sizes provides dependable, economical answers to the overwhelming majority of industrial requirements. Stanscrew's complete stocks at three convenient plants provide insurance against delivery interruptions. And, a really fast delivery policy avoids costly production interruptions in emergencies.

Call your local Stanscrew distributor today. He will be happy to arrange a prompt visit from the Stanscrew fastener specialist. Often his suggestions on assembly procedures, inventory adjustments or fastening techniques can cut your costs.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

For more facts circle 475 on Reader Service Card

BUY WORTHINGTON PUMPS LOCALLY IN 235 CITIES

Take a look in your Yellow Pages under "pumps" and see. Chances are overwhelming that you'll find a Worthington dealer there, and only a local call away. We have over 235 distributors covering nearly every trading area in the country.

So what's your advantage? One is that if you standardize on Worthington standard pumps, for locations coast-to-coast, Worthington can be a local supplier to every installation. Another is that you're dealing locally, face-to-face with men who are willing to be held responsible—and who will be there when needed.

Extremely important—you get very quick service. Remember, over 200 of these distributors stock parts—seals, bearings, packing, impellers—the kind of parts that handle 19 out of 20 emergencies. And many stock a variety of commonly used pumps.

Perhaps, however, what's of most interest to you is the seven regional Worthington assembly points. They're all F.O.B. points—even the furthest plant from a Worthington assembly point pays less than 800 miles freight . . . and you're probably much closer. From any one of these locations we can deliver more models than most other manufacturers build all together.

If you don't know who your Worthington distributor is right now—take a quick look in the Yellow Pages. We think you'll like the service you get. Worthington Corporation, Section 20-20, Harrison, N. J.

WORTHINGTON

For more facts Circle 476 on Reader Service Card

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor, FACTORY

(For more information, circle item numbers on Reader Service Card next to back cover)

Badge reader is new addition to data collection system *(IBM)*, linking man to work on production line. Now department and man numbers can be flashed to control center, together with variable data via manual entry (also new) and data from job card transmitted via punched card reader. **(236)**

Frigid feet? For people who have to work on cold floors new radiant unit *(MacNeal & Dashnau)* automatically provides constant 10-deg. increase in temperature at flood level. Measures 20x24x5/16 in. **(237)**

ABC of Pallet Handling is modest primer *(Raymond)* whose 16 pages tell you just about everything you need to know—types of pallets, how to estimate pallet requirements, how to load, loading patterns, etc. **(238)**

Gotta hotel reservation for Jan. 23-25? Better write your favorite Chicago innkeeper today—if, that is, you aim to visit the 12th National Plant Maintenance & Engineering Show & Conference. And don't forget, no standing in line at registration booth if you've sent in your pre-registration card. To get yours, circle this number on Reader Service Card. **(239)**

From Britain comes an inspection kit *(Ellis Optical)* with probes, mirrors, magnifiers, lights that make it possible to illuminate the most inaccessible spot through the almost impossibly small aperture. **(240)**

Booklet of the Month turns out to be computer characteristics chart *(Adams Associates)* that catalogs salient features of all 43 general-purpose, stored-program digital computers now (as of July 29) being built in the U. S. Here, in easy-to-compare form, are facts you need. **(241)**

Little Joe's a handy-dandy soldering-iron tip cleaner *(Macdonald)*. One pass through LJ and tip's ready for re-use. **(242)**

Padlocks, anyone? They say new 1½-lb. Heavyweight *(Hurd)* is largest and strongest made. It's shock-, saw-, force-proof. Harder anyone tries to break it open, tighter it locks and holds. **(243)**

Big advantage of new Bureau of Mines approved mask *(Willson)* is airtight seal with just two adjustable straps—one on top, one in back. **(244)**

Rearranging plant offices? Sounds easy. And is, if you're working with 3-D models. Our recommendation: office planning kit *(Visual Plant Layouts)* which contains 120 items—from desks to wastebaskets—plus clear plastic grid planning board and templets of all equipment. **(245)**

Add Ice-Chaser to list of snow-and-ice removers. It's non-corrosive compound *(Consolidated Paint)* of heat-generating chemicals in pellet form. No residue. Sample test kit (gratis) will show how it works. **(246)**

Time-consuming job of punching cards manually from original source documents for data processing has been eliminated by new and wonderful Optical Scanning Punch *(Remington Rand)*. It reads handwritten markings on standard tabulating cards, punches holes in 'em—at 150 cards per minute. **(247)**

At fraction of cost of solid alloy piping, bimetallic pipe *(Gray)* provides fabrication and strength advantages of carbon steel systems, combined with corrosion resistance of best alloys. **(248)**

Nylon Drill-Dapters *(American Twist Drill)* comes in two styles: red, to protect new drills; white, to give new life to old ones. **(249)**

When we think of visual control, we zero in on Rol-a-chart *(Conley, Baltzer & Steward)*, the chart with the write-on, wipe-off rolling sleeve that gives you 8 sq. ft. of chart area in 2 sq. ft. of wall space. Now, for added flexibility and versatility, Rol-a-chart has come up with magnetic write-on strips and indicators that can be quickly rearranged or removed. **(250)**

For sure-thing gripping and holding friction on wet or slippery surfaces, there's a new neoprene glove *(Wilson)* with molded-in cross-hatched finish. In three weights of black neoprene, two of white. **(251)**

Chemical workers —chippers and welders, too—will like new acid-resistant goggle *(Bausch & Lomb)*. Has soft-rolled edges, yet fits face securely. Provides wide-angle vision. Fits over any eyeglass frame. With vents (for welders and chippers) or without (for chemical workers). **(252)**

Taking inventory? Why not pressure-sensitive tags *(American)*? You stick stub on item being counted. No staple, string, tape. **(253)**

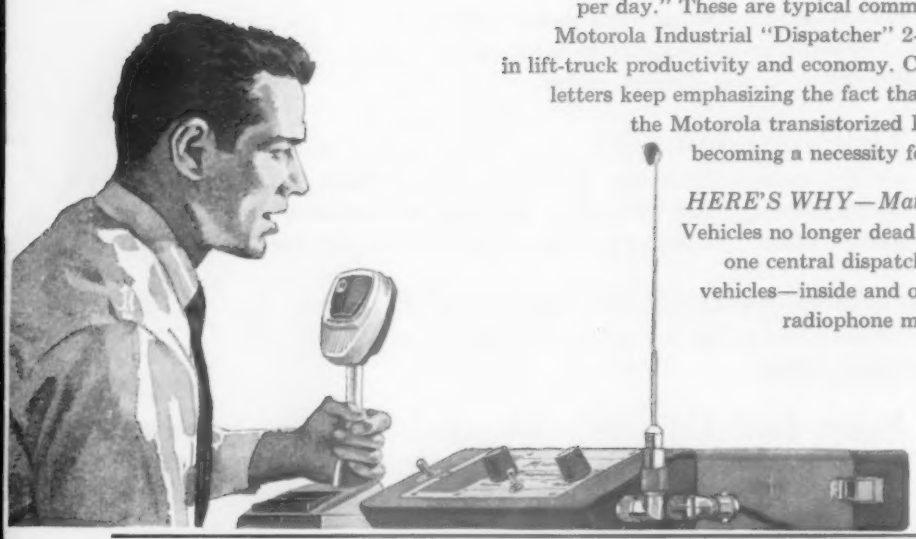
Invert-A-Bin is new semi-bulk shipping and storage container *(Powell)* for flowable dry products—flour, sugar, coffee, chemicals, etc. Steel or aluminum. Sizes: 36, 65, 88 cu. ft. Will hold 60,000-lb. loads. Containers seal hermetically to handle toxic or hygroscopic materials. **(254)**

Best-looking safety glasses yet —and still engineered for maximum protection—are the new Durasafes *(American Optical)*. Bridge and eye sizes to fit, colors and combinations to please, everyone. **(255)**

Turn the page

SAVE TIME SAVE MONEY

2-way radio . . . indispensable tool for increasing the efficiency of materials handling operations



HERE'S PROOF—"Almost 100% truck efficiency" . . . "3 now do the work of 5" . . . "2 hours more production per truck, per day." These are typical comments from companies where the new Motorola Industrial "Dispatcher" 2-way radio is turning in new records in lift-truck productivity and economy. Careful surveys as well as unsolicited letters keep emphasizing the fact that, in the field of materials handling, the Motorola transistorized Industrial "Dispatcher" radio is fast becoming a necessity for firms who must stay competitive.

HERE'S WHY—Materials now move according to plan. Vehicles no longer deadhead and backtrack. Motorola links one central dispatcher with all your materials handling vehicles—inside and outside. The Motorola "Dispatcher" radiophone mounts easily on any vehicle; it's the

IDEAS OF THE MONTH . . . *Begins on page 178*

(For more information, circle item numbers on Reader Service Card next to back cover)

Long conferences to be recorded? Changing tapes a nuissance? Better consider new Reporter *(Soundscriber)* which provides up to 16 hours of continuous recording with single spool of tape. Recording can be transcribed by plugging in listening device and foot control. **(256)**

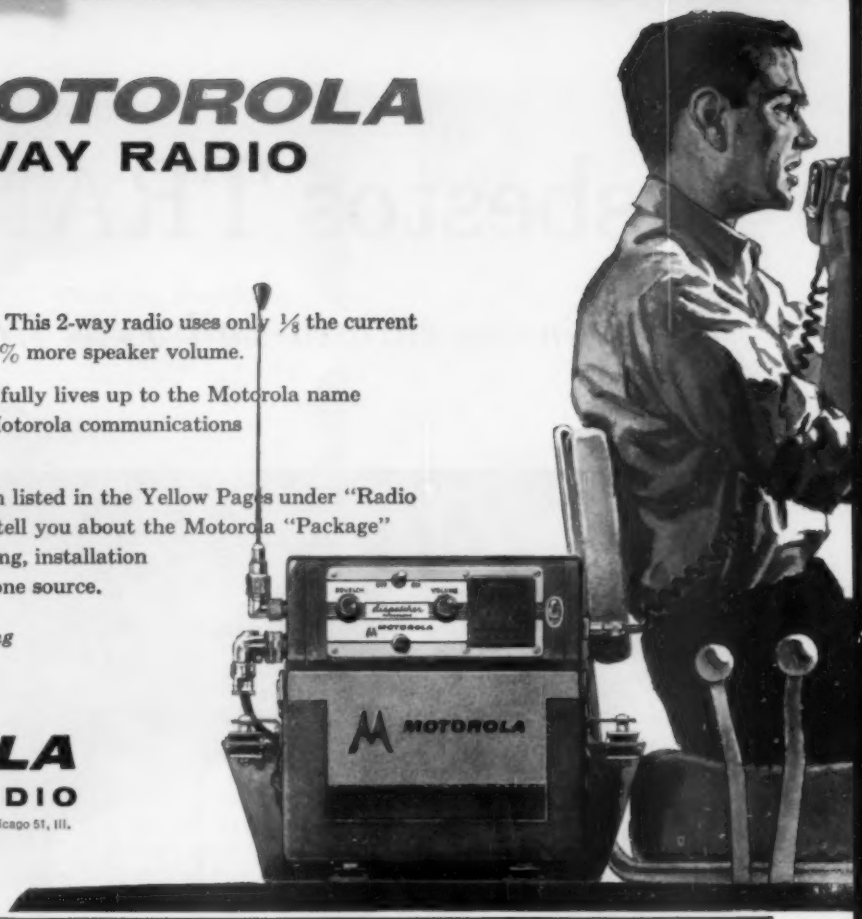
You can protect investment in ring thread gauges at small cost by buying rubber guards *(Geometric)*. Green for *go*. Red for *not go*. **(257)**

Move up to bulk handling, says new 6-page booklet *(Dracco)* which tells why that's a *must* for users of polyethylene, polypropylene, polystyrene, PVC. So why not for users of several dozen other bulk materials? **(258)**

Don't buy Christmas decorations for plant front or roof until you've perused Bulletin 6000 and "Christmas 1960" *(General Plastics)* which picture—mostly in full color—a coupla dozen of the handsomest illuminated displays (both single- and double-face) we ever chanced to see. **(259)**

Magnetic retriever *(Safety Vacuum Lifter)* has magnet mounted on 18-in. flexible shaft to pick up washers, screws, nuts, bits of metal, from hard-to-get-at places. Strong enough to lift small tools. **(260)**

WITH MOTOROLA 2-WAY RADIO



smallest industrial radio available today. This 2-way radio uses only ⅛ the current required by other radios, yet delivers 50% more speaker volume.

The Motorola "Dispatcher" radiophone fully lives up to the Motorola name for dependability. Industry uses more Motorola communications systems than all makes combined.

Call your Motorola man. You'll find him listed in the Yellow Pages under "Radio Communications Equipment." Let him tell you about the Motorola "Package" —how your systems engineering, financing, installation and maintenance, can be handled from one source.

Write today for your free Materials Handling 2-Way Radio Fact Kit.

"Dispatcher" is a trademark of Motorola Inc.

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Ill.
A Subsidiary of Motorola Inc. SPaulding 2-6500

Circle 477 on Reader Service Card

Oil analysis in 12 minutes. With field test kit *(R. & W. Engineering)*. Prevents use of contaminated oil—also premature changing. **(261)**

Handy-dandy bolt bin *(Durham)* solves problem of storing nuts, bolts, washers, small parts. 42-in. high by 36 wide by 12 deep. 72 compartments, each 4½x4½x12 in. Made of all-welded heavy-duty steel. **(262)**

Takes only two lines to suggest 2-finger polyethylene glove *(Singer)* for use where low-cost protection is needed against acids, caustics. **(263)**

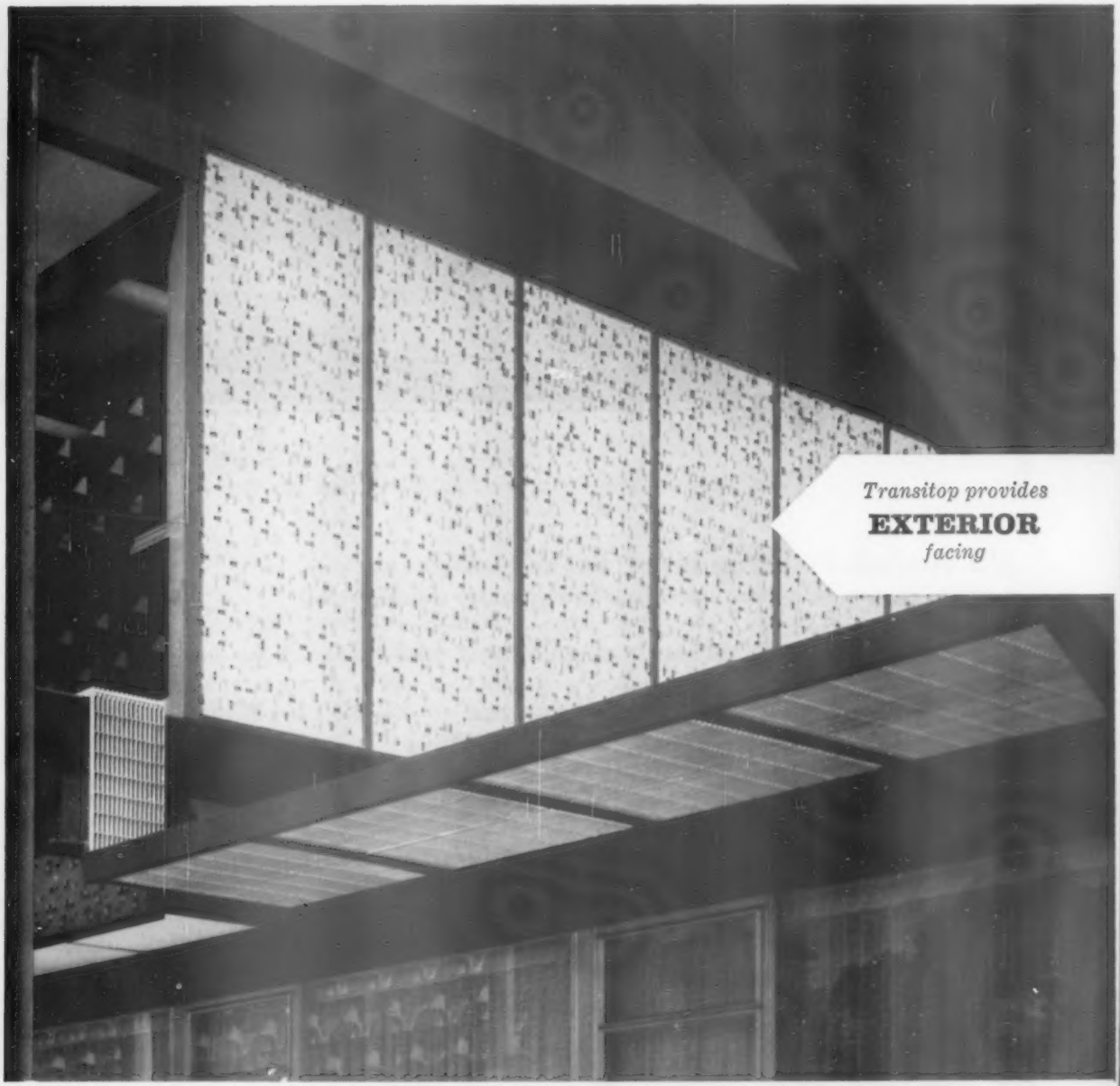
Corrosion data charts *(Nooter)* indicate resistance of 16 metals and alloys to various concentrations of more than 250 salts and acids; also to 100 common materials like water, glue, fruit juices, milk, turpentine. **(264)**

Versa-Magnet is handy lamp holder *(Standard Portable Cord)*. Ball-swivel clamp permits use with almost any old light. 45-lb. pull. **(265)**

Storage aisles too narrow for lift trucks? Be of good cheer. Answer—and you probably know it—is Stacker Crane *(American Monorail)*. All you need is width of load plus 15 to 18 in. Booklet proves all. **(266)**

Asbestos TRANSITOP®

the all-in-one curtain-wall panel from Johns-Manville



Administration Building, Thiokol Chemical Corporation, Bristol, Pennsylvania Architect: W. Henry Neubeck, A.I.A.

EXTERIOR—On the building at left, the exterior asbestos-cement facing was veneered with a colorful mosaic tile design applied on the job. Transitop accepts almost any surface material. It can, of course, be painted . . . or used "as is" in attractive light gray.

INSULATION—In the photograph at left center, you see a full-sized end view of one of the Transitop panels forming the wall. It is only 1⅞" thick, yet its insulating effectiveness is equal to a 24-inch-thick masonry wall! Note how the integrally impregnated core of insulating board is laminated to non-combustible Asbestos Flexboard® panels for strength and toughness. Transitop is available in 1½", 1⅛", 1⅞" and 2" thicknesses . . . in units 4′ x 8′ to 4′ x 12′.

INTERIOR—The interior asbestos-cement facing forms inside office walls. These were painted, as shown above, to suit the interior color scheme . . . but with Transitop, you can use virtually any other surface treatment your interior design demands.

Send now for details. For more complete information, ask your Johns-Manville Representative for a copy of the J-M Transitop brochure, FLX-23 A. It's a complete 35-page illustrated booklet containing product data, design details, physical properties, tabulations. Or write Johns-Manville, Box 158, Dept. F-11, New York 16, N. Y. In Canada: Port Credit, Ontario. Offices throughout the world. Cable: Johnmanvil.

JOHNS-MANVILLE JM

By PAUL A. KING, Member, New York Bar

Employee health—how much interest can you show?

When the union takes an avid interest in an employee's health, it's representation. When management does it, it's paternalism.

NEWS TIPS

• When around-the-clock operations are a necessity, consider inserting a clause in your contract that no employee can leave his shift until released by his supervisor. Upholding such a clause, an arbitrator supported the company which fired an employee who walked off the job without having been released.

• Now add "help-wanted" advertising to such business barometers as unemployment figures, freight car loadings, and stock averages. The National Industrial Conference Board has come up with a business condition index based on help-wanted ads. Says the Board: "The help-wanted index shows a high degree of sensitivity to the business cycle, and particularly to labor market conditions."

• When you agree to an NLRB representation election, just leave it to the NLRB to run it. Two weeks before the official election, this employer conducted his own secret "straw vote." He won the official election, but because of his own poll the election was set aside. The Board ruled that it didn't make any difference that he hadn't announced the results of his straw vote until after the official vote.

• If the contract clause doesn't place a time limit on filing a grievance, the union has a "reasonable" time in which to complain. When a time limit is specified in the contract, arbitrators will adhere to it strictly. This is particularly true if the clause reads that the grievance "shall" be filed within X days—not "may".

When unions moved in, most of management's paternalism moved out. However, one vestige still seems to hang on: the employee's health. How much of an interest can you show without being guilty of paternalism?

When an employee's ill health will adversely affect the way he does his job or will endanger the safety of fellow-workers, you can see a legitimate reason for employer interest. When there is no such relationship, the question arises: What business is it of the employer? Suppose the employee wants to gamble with his health?

Cases frequently arise involving the cardiac patient. His doctor says he can work. The company's medico says no. But if the only danger is to the employee, why shouldn't he get his job back, the union will argue. In a recent heart case that went to arbitration, the employee's doctor stated that returning the employee to his job would definitely be a gamble. But he also pointed out that the gamble was one which should be up to the worker. If he became ill at work, the job he was doing would not suffer—and the life of the employee's fellow-workers would not be endangered. The arbitrator endorsed this view.

But still employers insist upon being concerned about the gamble. An A & P bakery employee suffered a heart attack. He was a janitor in the doughnut department. His task was to lift and clean heavy equipment and mop 2000 square feet of floor each day. Then came the heart attack. The employee's doctor pronounced him fit for work, but not a cardiologist who looked him over for the company. So an impartial heart specialist picked by the union and the company examined the employee. This doctor pronounced him fit for work—but light work only. And there was none readily available. So the company refused to take him back.

Was the task hazardous to other employees if the employee should drop dead at work? Would equipment be damaged? Setting these considerations aside, the company felt responsible for the health and safety of its employees. It argued that it should not be required to subject itself to a risk of liability, a situation which would occur if it was required to reinstate a disabled employee.

But the employer was not the only one who felt this way. The arbitrator, too, felt that the employee was gambling with his life—something he shouldn't do. And the arbitrator upheld the discharge.

Arbitrators, we daresay almost all of them, will uphold the discharge of an employee whose ill health endangers the safety of other workers—or company equipment. Many will support discharge where such a threat doesn't exist—as in the A & P case.

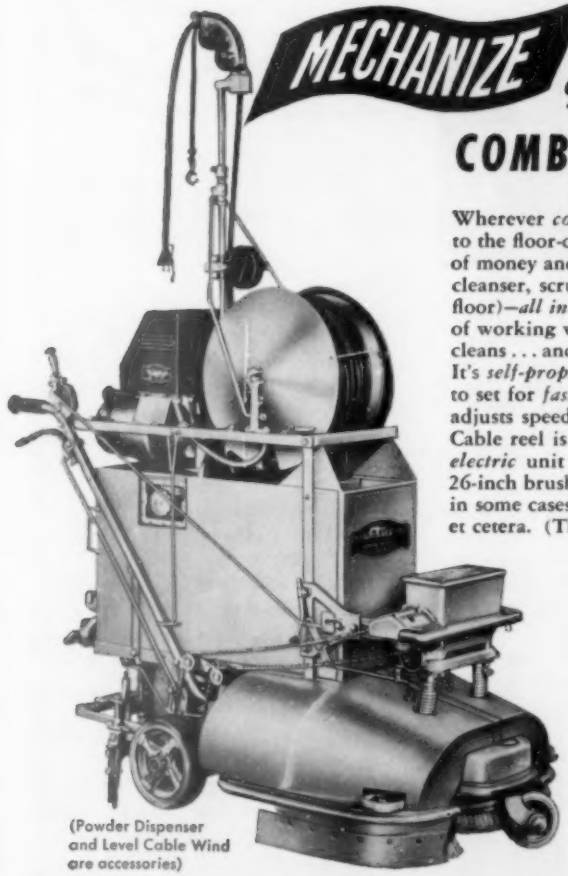
Whenever you discharge because of an employee's ill-health—regardless of your reasons—obtain reliable evidence that the employee's health was really bad. When your doctor and the employee's doctor do not agree, try the A & P way: You and the union select an impartial third doctor.

But this may be costly and cumbersome. Often you can support your case adequately without intervention of an impartial doctor—if your specialist states his case well.

Turn the page

Let's not clean away dollars and man-hours with costly, inadequate floor care

MECHANIZE *your floor-cleaning with a* COMBINATION SCRUBBER-VAC!



(Powder Dispenser and Level Cable Wind are accessories)

Wherever *combination-machine-scrubbing* is the practical solution to the floor-cleaning problem, any lesser, slower method is wasteful of money and manpower. A *Combination Scrubber-Vac* applies the cleanser, scrubs, flushes if required, and picks up (damp-dries the floor)—*all in one operation!* Maintenance men like the convenience of working with this single unit . . . the thoroughness with which it cleans . . . and the features that make the machine simple to operate. It's *self-propelled,* and has a *positive* clutch. There are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs quietly. Cable reel is self-winding. *Finnell's 213P Scrubber-Vac* at left, an *electric* unit for heavy duty scrubbing of large-area floors, has a 26-inch brush spread. Cleans up to 8,750 sq. ft. per hour (and more in some cases), depending upon condition of the floors, congestion, et cetera. (The machine can be leased or purchased.)

Finnell makes *Scrubber-Vac Machines* in a full range of sizes, and in *battery-*, *gasoline-*, and *propane-powered* as well as *electric* models. From this complete line, you can choose the size and model that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that *a Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of the machine . . . to recommend cleaning schedules for most effectual care . . . and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2511 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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Originators of Power Scrubbing and Polishing Machines

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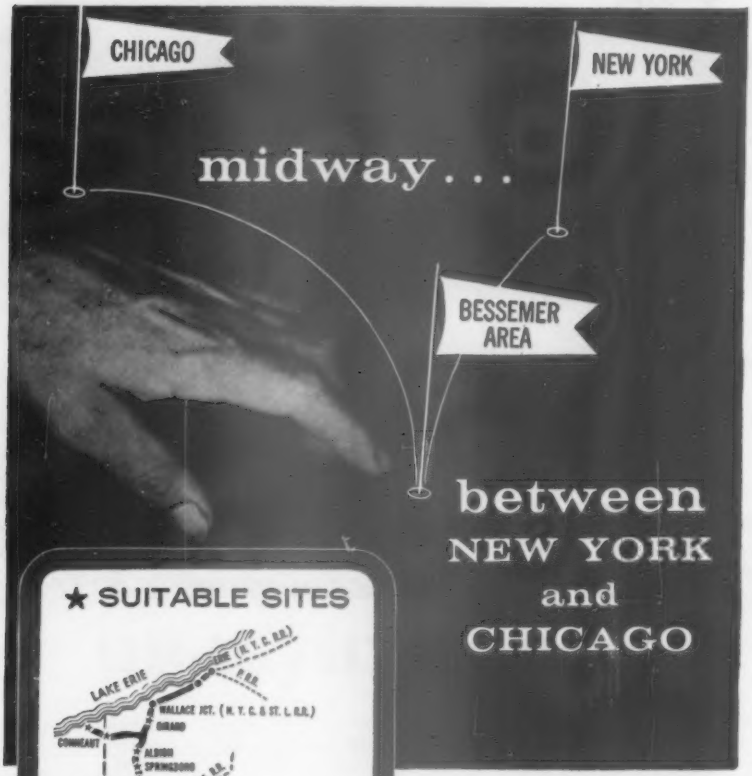

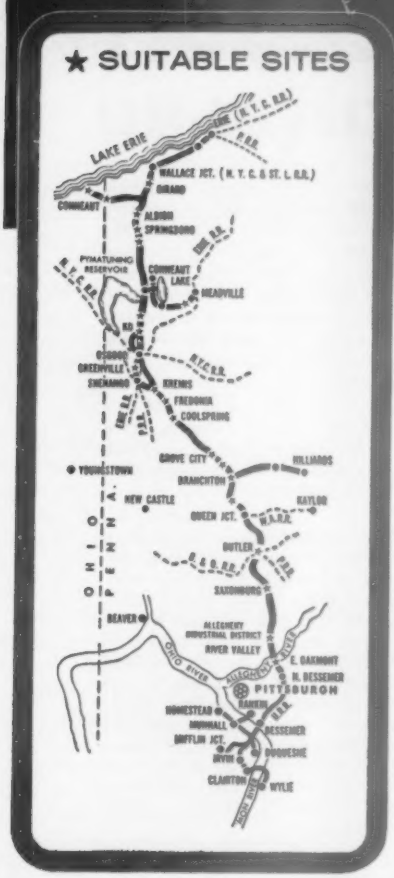

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The Bessemer Man is at your "Site Service"

Begins on page 184

Barroom Brawling

If an employee's ill-health can be of legitimate concern to a company, how about his conduct off the job?

Most arbitrators will agree that what a man does outside of working hours is his own affair. He can be legitimately disciplined on the job for his outside activities only if what he does reflects adversely on the plant or interferes with the plant's operations. For example, a company rightfully fired a worker who, at a public meeting, made disparaging remarks about its wage-and-salary policy. The arbitrator upheld the discharge. But arbitrators have reinstated employees who have committed rape, been guilty of drunken driving, and running around with other men's wives. Arbitrators have set themselves up as the conservator of an employee's private life. And just a while ago, it reinstated an employee who participated in a barroom brawl. He had been charged with assault with a deadly weapon. The company fired him because:

- **He had a disposition toward violence.**
- **Had previously engaged in horseplay.**
- **Cursed very often on the job.**

The arbitrator found no connection between his barroom brawling and the plant, so ordered him put back on the job.

Disputed definition

What's in a word? To Justice Holmes it was a skin of living thought. To plant executives who interpret contract clauses it may mean nothing but trouble.

Mr. Justice Holmes put it this way: "A word is not a crystal, transparent and unchanged; it is the skin of a living thought and may vary greatly in color and content according to the circumstances and the time in which it is used."

Such a view may make beautiful prose, but it is certainly destructive to the peace of mind of the plant executive who must interpret the words of his contract to his satisfaction and to that of the union.

Under the contract of a milk-

WRIGHT SAFEWAYS
Now Available in
ALUMINUM or STEEL

Take the finest hand hoist ever made for simplicity of design and sturdiness of construction...add to it new external and internal parts of aluminum...and you have the WRIGHT Aluminum Safeway Hand Hoist. This hoist is made lighter and more easily portable, yet retains all the advantages of the original Safeway design. It features load-bearing parts of strong, shock-resistant steel. Aluminum replaces the heavy steel covers, chain guide and hand chain.

It is a self-lubricating hoist which keeps load chain, load wheel and gear train operating smoothly at all times. Gear train is enclosed in grease-tight chamber and stays lubricated for life. Load chain and load wheel are lubricated by wick-type oiler fed from refillable reservoir.

Two factory tests certify the accuracy, workmanship and rated load-carrying capacities of these new aluminum hoists. Every foot of load chain is proof-tested and every completed hoist is tested at 50% above rated capacity.

Available now in six models in a capacity range of ½ to 4 tons, WRIGHT Aluminum Safeway Hand Hoists offer these outstanding features:

GEAR TRAIN • Planetary system using modified involute stub tooth gear form with all gear teeth generated from solid steel blanks.

LOAD BRAKE • Weston type with uniform composition lining and silent pawl.

LOAD WHEEL • Ferrous alloy, reversible, with accurately formed pockets.

LOAD CHAIN • Electrically welded, has maximum wear resistance and ability to withstand extreme impact.

LOAD CHAIN GUIDE • Guides chain into load wheel and shrouds load sheave, protecting parts from falling dust.

BOTTOM HOOK • Nickel-chrome-molybdenum alloy steel. Rocks and swivels. Operates on a Timken thrust bearing.

Contact Your WRIGHT DISTRIBUTOR

Or write our York, Pa., office for DH-164 and DH-345 which give complete information about WRIGHT Safeway Hand Hoists made from aluminum and steel. Find out the advantages they offer you.

In Canada: **UPTON, BRADEEN & JAMES LTD., Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Vancouver**

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For more facts Circle 481 on Reader Service Card

Begins on page 184

processing company, job vacancies had to be posted for bidding. The processor tried to justify its failure to post a job by distinguishing between filling a vacancy in an existing job and hiring an employee for a newly-created job. Reasoned the company: a "vacancy" cannot occur in a job which doesn't exist. A vacancy can only happen in an existing job which was at one time filled and has become vacant. To prove its point, it cited many court cases.

The arbitrator didn't convince easily. He believed: "To a reasonable mind, a 'job opening' is a vacancy at the instant the company decides there is need for the job to be manned." Furthermore, "To rule . . . that the employees may only bid on jobs which are now in existence not only seriously curtails and limits the clear rights of the employee, but also violently distorts an orderly procedure wherein employees may, through their length of service, enjoy promotional advantages and shift preference."

Questioning Workers

An employer is always free to question a worker to find out the underlying causes for dissension in the ranks—but if he says anything that tends to interfere with the right of his employees to organize, he can be guilty of an unfair labor practice.

How to walk a straight line between getting useful information and tangling with the law is not easy—particularly when NLRB members with years of experience disagree as to whether or not, in a given situation, the employer has exceeded the bounds of proper investigation.

NLRB Member Jenkins thought that the personnel manager of Anderson Air Activities, Inc., Malden, Mo., who cross-examined an employee about a bad employee situation, was not legitimately motivated. Said he:

"The eager, inquisitive nature of his questioning, coupled with a comment which might have been construed as a promise of benefit, demonstrated more than a mere interest in employee dissatisfaction as such. Viewed in context, it appears

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2-STRIP

REINFORCED TAPE

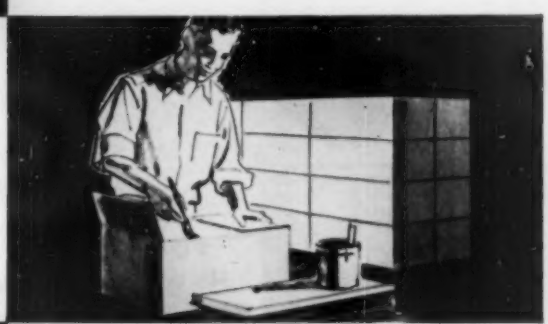
Gives Faster, Stronger, Lower Cost Closures

REINFORCED TAPE
vs
← PLAIN TAPE

Only two strips of reinforced tape are needed as against *six strips* with plain tape. Figure what your shipping room can save per day, per week, per month in time and labor costs. Best of all, your customer is assured of safe, sure arrival of his shipment.

REINFORCED TAPE
vs
GLUING →

An independent test showed two-strip reinforced tape ahead of gluing by 55 boxes per hour (240 boxes as against 185 boxes). Reinforced tape sealed cartons are stronger too.



REINFORCED TAPE
vs
← STAPLING

The same independent test showed reinforced tape sealing even further ahead when compared with stapling. The score: 240 boxes per hour against 101 boxes. Yes, and reinforced tape adds to container strength — keeps it stronger, longer.

Two-strip sealing with reinforced tape is approved by all carriers. Write for further information to our home office in Attleboro, Mass.

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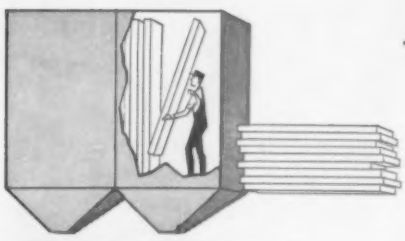
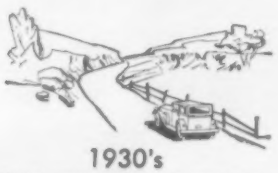
SLY DUST FILTERS For ACCESSIBILITY



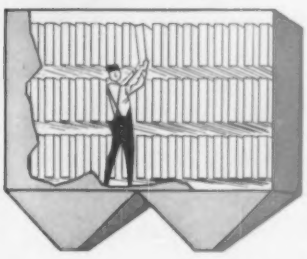
1900's
SLY DUST ARRESTER

Every cloth screen from the end of the arrester had to be removed to reach the faulty screen.



1930's
SLY TUBE-TYPE FILTER

To replace a tube required at least partial disassembly of every other tube in the way.



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NEW SLY
"ROLL-CLEAN"
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Any filter bag is easily accessible and can be replaced without need for removing others.

NEW SLY DYNACLONE PROVIDES FASTEST, EASIEST BAG CHANGING

Whether you change one bag, or the entire filter, you do it in less time with the Dynaclone. Quick replacement of individual bags eliminates the need for costly rebagging should only a few be worn. Complete change is also fastest . . . the Dynaclone has only one half as many bags as other filters with the same cloth area. In addition . . .

New "Resist-O-Wear" bags offer 200 to 300% more bag life.

The Dynaclone operates continuously. It provides complete dust suppression through constant suction.

The Dynaclone is automatically self-cleaning by reverse air. A single exhaust fan provides *both* suction for dust collection and air for bag cleaning. No auxiliary blowers required.

And the Dynaclone provides 20 to 40% more cloth in a given space than other makes of dust filters.

The Dynaclone has been proved in more than 1,000 installations. Investigate its advantages on your applications . . .

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Begins on page 184

to me to be a patent attempt to get information about the union in a coercive manner prohibited by law."

His fellow members on the Board disagreed. They felt that the only reference to the union made by the personnel manager was that he knew union cards were floating around and that if the employees wanted a union it was their own business. What counted most in favor of the company in the Board's decision was the company's previous record of being free of union hostility. But it does remind employers: Sure, investigate discontent in the ranks—even if a union is hovering at the door, but say nothing for or against the union. Make no promises of benefit if the union is kept out—no threats of dire consequences if the union is voted in.

Informational Pickets

Informational picketing without an application for an election is okay, although recognition is the ultimate idea.

Under the new labor law, recognition picketing without filing an election petition within 30 days is out. But *informational* picketing is okay—if it doesn't interfere with pick-ups and deliveries, and doesn't induce employees not to work for the picketed employer.

But where do you draw the line when it starts off as recognition picketing and changes in midstream to informational picketing? Suppose the union initially asks for recognition—then changes its signs to be informational, but doesn't withdraw its request for recognition? Are you supposed to read the union's mind?

Here's the only thing that counts: The picketing must not violate the law in the respects stated above. The union's state of mind is irrelevant.

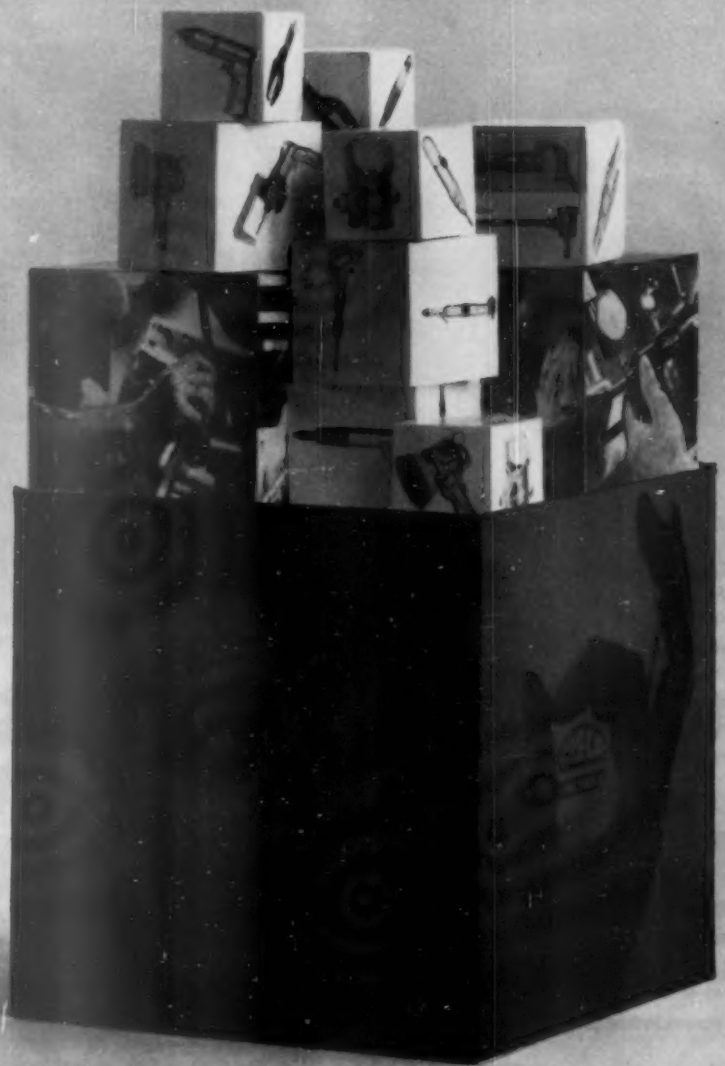
One union started a recognition-picketing campaign. A court enjoined it because the union hadn't called for an election within the prescribed time. The union switched to informational picketing. Pickets toted this sign in front of the employer's building: "To the public: This is to inform you that Charelton Press, Inc. does not have a contract

ever hear of the Cleco

"quality control package"?

"Quality Control Package" is the term we use to describe our method of designing, manufacturing, and servicing air tools. Too, we think this term best describes what Cleco offers you. Outstanding tools, engineering assistance, and service directed towards helping you increase the quality of your products with greater speed and economy.

Built-in quality is a vital part of the Cleco "Quality Control Package." Cleco air tool designs are never finalized until their value has been proved on customer operations. In the production phase, our roving specialists perform 100% surprise inspections at all critical points. Each and every completed tool is tested in a sound-proof room . . . checked against engineering specifications for power, air consumption, and speed. Appearance, too. **From Cleco® you get quality all the way.**



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"quality tools engineered for industrial progress"

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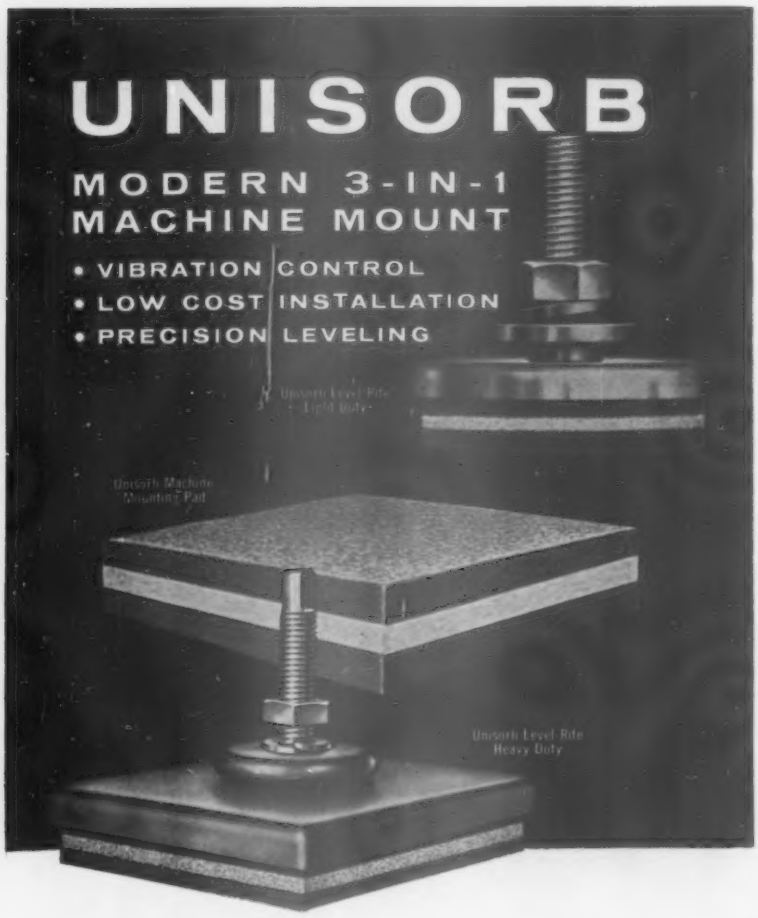

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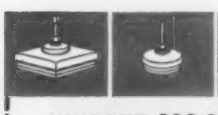

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Please send me details on new Money-Mount Promotion.

Name.....
Company.....
Address.....
City.....Zone.....State.....

FED-10

Begins on page 184

with Ansonia Typographical Union 285. This information should not be taken to induce any person in the course of his employment not to pick up, deliver, or transport goods or not to perform services. This picket sign should not cause anyone not to perform such service or cross the picket line. I.T.U. 285, AFL-CIO."

The union did not tell the company it had given up the idea of recognition. Nor had it withdrawn an unfair labor practice charge that the company had refused to bargain with the union. What the union has in mind is not a determining factor in informational picketing. It's the effect of the picketing. The only relevant question: Did it interfere with services and deliveries?

Pay Schedules

How and when you pay employees —and contribute to their welfare plans—is not solely up to your payroll department. State laws govern these payments.

How often do you pay your employees? Once a week? Want to change to twice a month? Is it in cash or by check? When must you pay off a terminated or laid-off employee?

Most states have laws determining the frequency and method of payment (and different rules may apply to salaries and wages). Some states give employers a little leeway, permit departures from state law if the commissioner of labor approves.

Here are some of these laws, all passed within the last several months. For a time it had been unlawful to pay employees in Massachusetts bi-weekly—even if you paid them a week in advance. Recent legislation now permits such payments to salaried employees. Employers can pay bi-weekly if wages are paid within six days of the work week in which they were earned.

Company payments to welfare plans are now coming in for regulation. For example, Michigan employers (with a few exceptions) are now expected to make their payments to employee welfare plans within three weeks—or it's a misdemeanor. In Massachusetts, it's

For more facts Circle 486 on Reader Service Card For more facts Circle 487 on Reader Service Card ➤

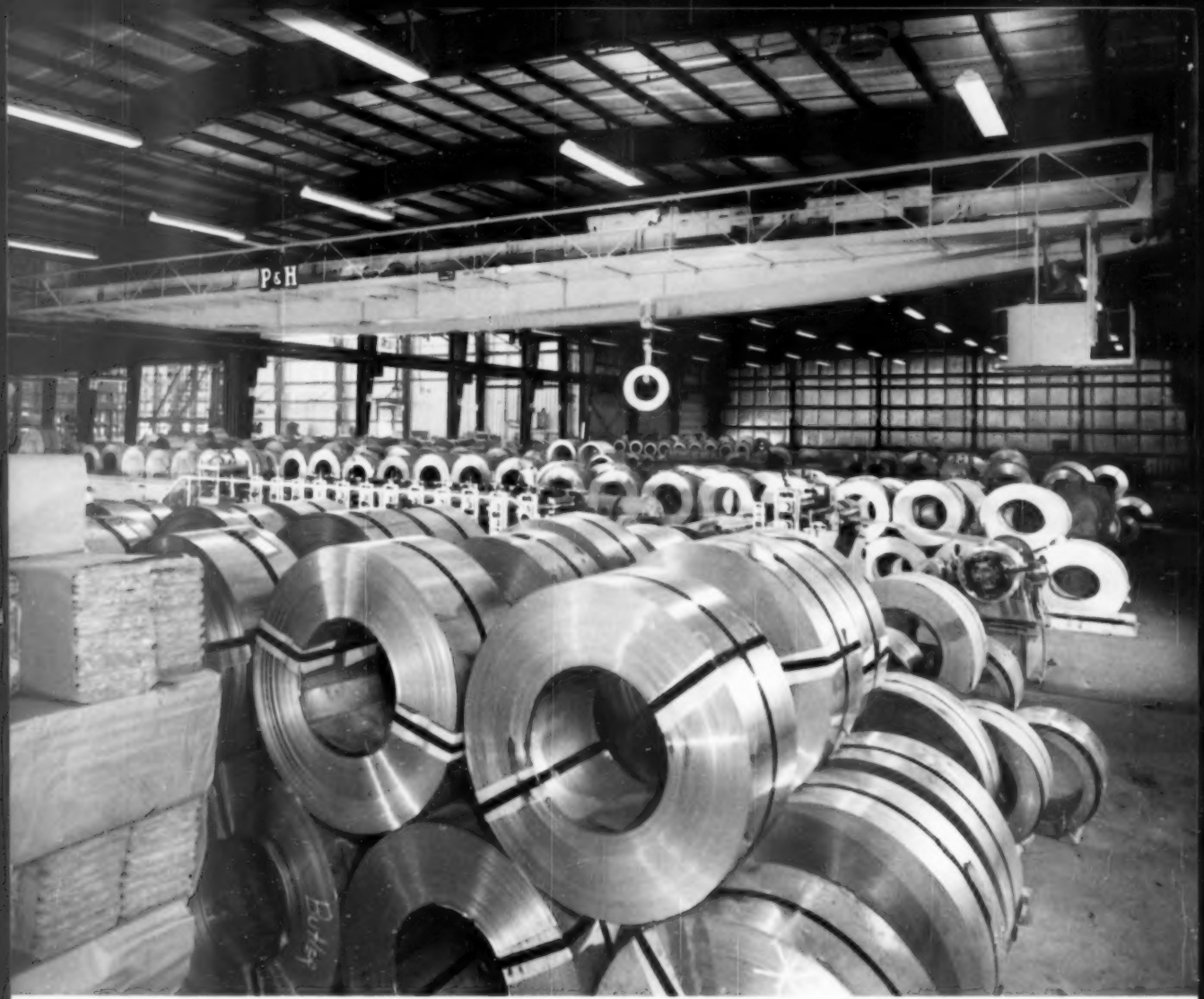


Photo courtesy Butler Mfg. Co., Galesburg, Illinois

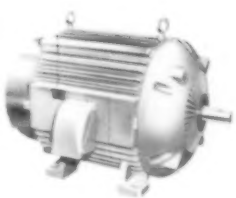
FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN METAL FABRICATION . . . One man in the cab of this P&H overhead crane keeps several slitting and roll-forming machines supplied with coils of metal for continuous production. In addition, he spots incoming coils in proper storage areas as they arrive from the mills.

This manufacturer of standardized commercial buildings gets full use of plant floor area by moving materials through the air. The P&H crane and special coil-handling hook eliminates the "dead" aisle space needed with floor-operated equipment. It also saves manpower, and the safe, precision handling reduces damage to finished stock.

As with every Harnischfeger installation, this long-span (87') crane is specially engineered to consider all factors that may affect operation on this particular job. Special problems are taken in stride, integrated into the overall design. Only this kind of integrated engineering can give you performance that's never in doubt, performance P&H crane users have relied on for over 76 years! Why not find out more about P&H "job-engineered" cranes? Write for bulletin C-42, Department 124, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

All P&H motors are built specifically for crane service—not adapted to it! P&H engineers have designed extra ruggedness into every part for maximum efficiency under the most severe conditions of fast acceleration, frequent reversals, and repeated shock loads. Thousands of P&H crane motors in every-day use prove that they give years of trouble-free service with minimum maintenance.



P&H
OVERHEAD CRANES

HARNISCHFEGER
Milwaukee 46, Wisconsin

SPACE AGE MARGIN FOR ERROR – ZERO!

This P&H Zip-Lift® hoist carefully lowers a computer unit for a missile inertial guidance system into its special shipping container. Fast, safe, handling is vital with intricate assemblies like this. That's why so many component manufacturers depend on P&H Zip-Lift wire rope hoists. There is never any doubt about safety, reliability, or positive control.

You may not handle missile components, but isn't fast, safe, dependable, precision lifting and spotting just as important to uninterrupted production in your plant? If so, it will pay you to find out more about the P&H Zip-Lift's quality design features — dual brakes, 24-volt controls, shaved gears running in oil, permanently lubricated bearings, just to name a few.

Best of all, the price is down low enough to make a purchasing agent smile! Write for bulletin H-20, Department 226, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

P&H
ZIP-LIFT HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

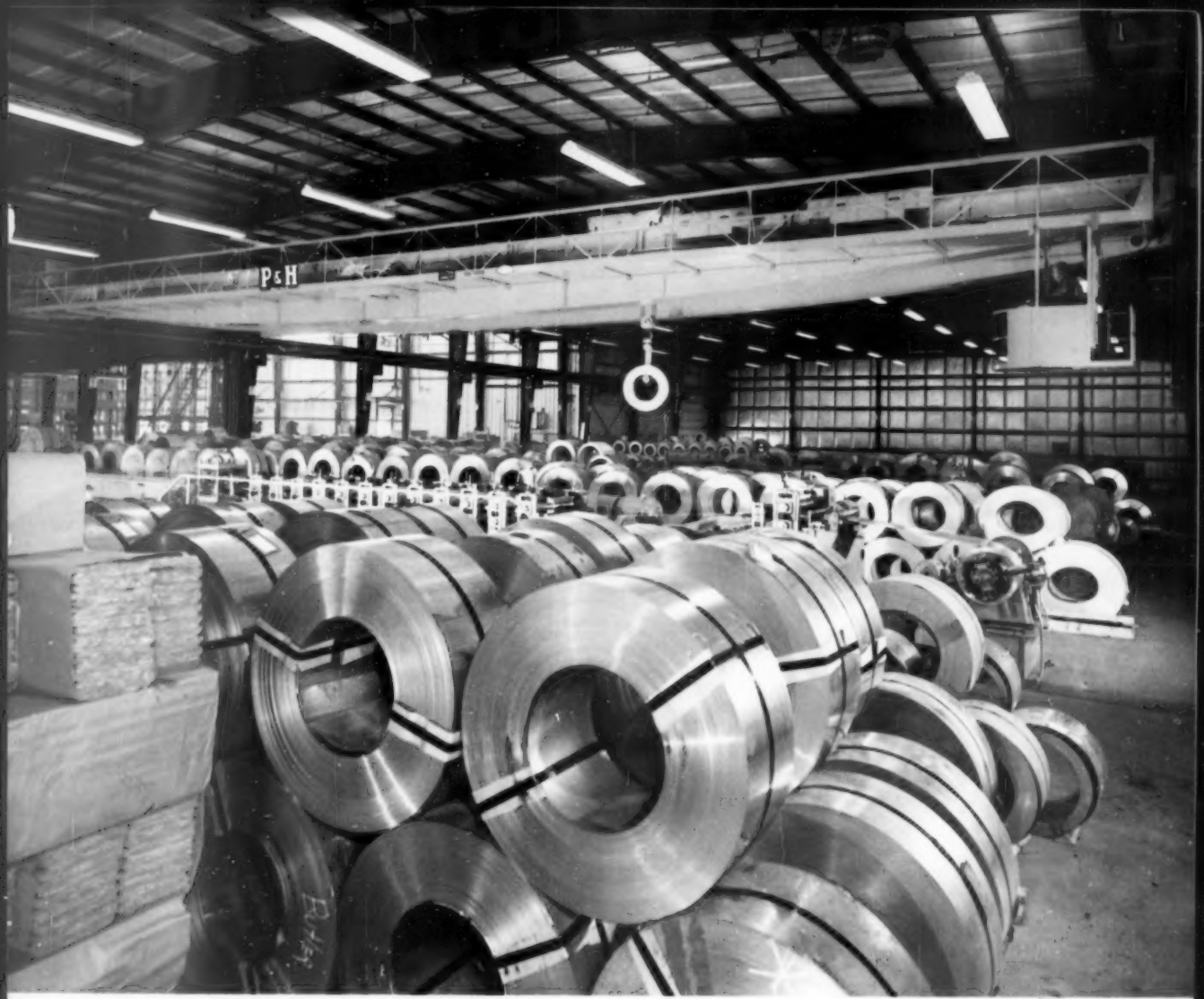


Photo courtesy Butler Mfg. Co., Galesburg, Illinois

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN METAL FABRICATION . . . One man in the cab of this P&H overhead crane keeps several slitting and roll-forming machines supplied with coils of metal for continuous production. In addition, he spots incoming coils in proper storage areas as they arrive from the mills.

This manufacturer of standardized commercial buildings gets full use of plant floor area by moving materials through the air. The P&H crane and special coil-handling hook eliminates the "dead" aisle space needed with floor-operated equipment. It also saves manpower, and the safe, precision handling reduces damage to finished stock.

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P&H
ZIP-LIFT HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

now the law that employers, when requested, must furnish employees with the amount and nature of paycheck deductions (in writing) for welfare plans.

Rule Violations

Sometimes there's just no way of predicting how an arbitrator will react to the penalty you may impose for a rules violation. It's arbitration roulette.

Innumerable articles have been written about how arbitrators handle discipline cases. Tips are offered on how to impose penalties that will stick, such as: "The punishment must fit the crime." If an employee clearly violates a safety rule and company property is damaged to the extent of several hundred dollars, a lay-off of five days would certainly seem to fit the crime. Who could say that a penalty of four, three, or two days would be more fitting? An arbitrator, of course, and in this case he did.

An airplane hangar employee left an equipment cart within a yellow-line forbidden zone. An overhead door was lowered and damaged the equipment—just what the yellow-line zone was supposed to prevent. In reducing the penalty from five to two days lay-off, the arbitrator found these mitigating circumstances.

- **The employee had a good record (but he knew about the zone and the risk).**
- **The yellow safety line had faded (but was clear enough for the employee to notice).**
- **He left the cart so it would not be in the path of an incoming airplane (from the frying pan into the fire).**
- **The door was closed by an unauthorized employee (if the cart hadn't been there, it wouldn't have been damaged).**

The moral? Some penalties will be reduced. Some arbitrators cannot be figured out.

(Selected items in this Labor Relations News section are developed from full citations published by the Bureau of National Affairs, Inc., Washington, D.C.)

LOOK BEHIND THIS NAMEPLATE

.. you'll find a background of 231 years' experience

It's almost fifty years ago that our founder, Halsey W. Taylor, pioneered the development of drinking-water equipment with a revolutionary, health-safe mound-building projector. He is still active today. Add his many years of specialized knowledge to that of our key personnel in research, design and engineering . . . and you'll find a combined experience of 231 years!

That's why it pays to look for this nameplate. It distinguishes a fountain or cooler that's Taylor-made . . . a product of ripened experience designed with an eye to tomorrow.

The Halsey W. Taylor Co., Warren, O.

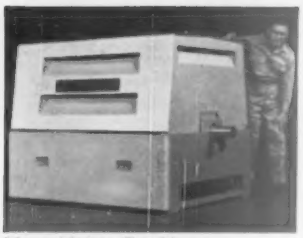
New Wall-Mount
A Halsey Taylor first. Mounts on wall, off the floor. Easily kept clean.

New "All-Climate" Outdoor Wall Fountain
Designed for outdoor use where temperatures drop below freezing. New all-weather features.

The Popular Wall-Tite
No exposed fittings. Fits tight against the wall. Space-saving!

460

ASK FOR LATEST CATALOG, SEE SWEET'S OR THE YELLOW PAGES

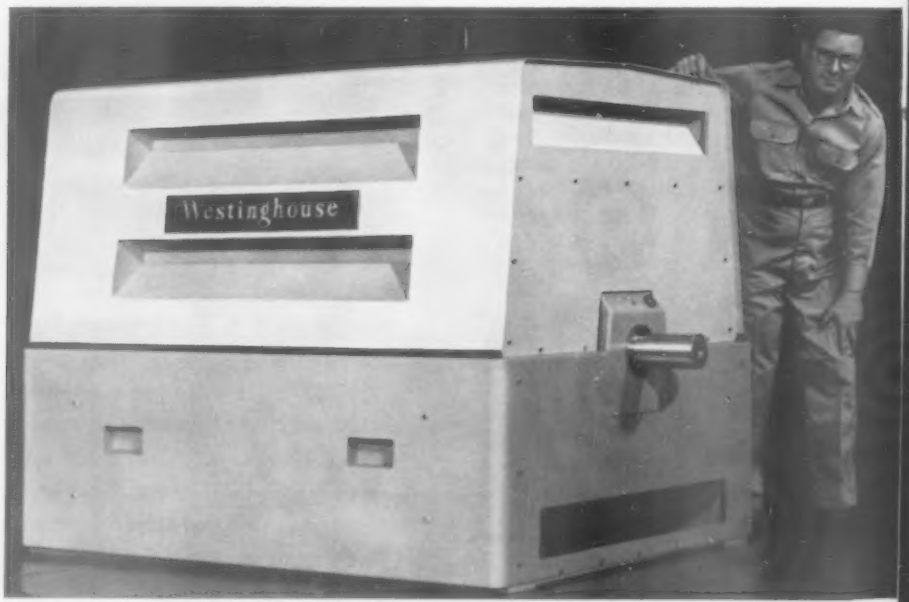


More Value For Your
Large Motor Investment . . .

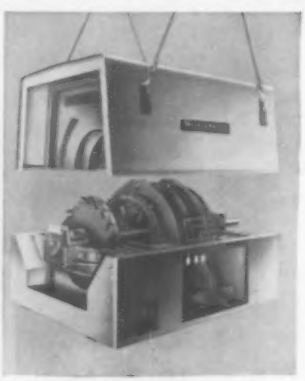
Westinghouse F/A Motor design

There's an F/A Motor enclosure to meet any of your installation requirements with standard horizontal drip-proof construction . . . NEMA weather-protected enclosures for normal *and* totally unprotected outdoor locations . . . totally enclosed fan-cooled tube-type motors and those having a cooler or heat exchanger.

Each sturdy F/A Motor enclosure is completely separate from the stator and can be removed in minutes for thorough visual motor inspection. In addition, inspection of leads, connections, windings and bearings is simple and quick . . . complete motor disassembly and reassembly take an average of only 3½ hours! Result: unmatched accessibility. This accessi-



Standard horizontal drip-proof enclosure for F/A Motors (at right) gives full accessibility. Cover can be quickly lifted off; removing end panels allows routine inspection of windings and bearings; end panels, covers and air shields can be removed in only 38 minutes, replaced in 56—with the motor still in running condition.



TEFC tube-type F/A Motor enclosure is shown at far left. The tubes are all mounted in top of enclosure, as shown in the next picture, and the motor is completely accessible when enclosure is removed.

wraps economies in a variety of enclosures

bility, coupled with the time-tested and -proved reliability of Westinghouse motor components, can save you up to 75% on inspection and maintenance.

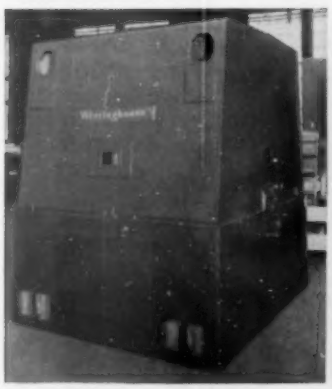
THAT'S NOT ALL. F/A Motors have unique Thermalastic® insulation which has been protecting coils in more than 50,000,000 kw of Westinghouse large rotating apparatus. Extensive testing shows that Thermalastic has a probable 100-year life. And F/A Motors are super-quiet . . . virtually eliminate the annoying whine typical of large motors.

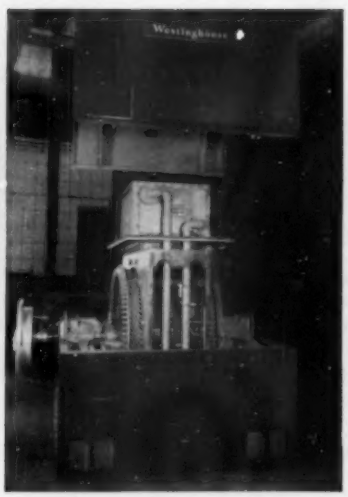
Check today for full information on Westinghouse F/A Motors. Your nearest Westinghouse representative has details . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-15618

Weather-protected enclosures: At left is the NEMA Type I weather-protected F/A Motor that's perfect for normal outdoor installations.

Right, a NEMA weather-protected Type II F/A Motor enclosure which provides maximum protection where adverse weather conditions prevail.





Enclosure for motors with cooler: Note the cooler is inside the enclosure, which can be quickly taken off to expose the cooler and internal motor components as demonstrated at right. Full accessibility of all F/A Motors means substantial savings on inspection time and dollars.

Westinghouse

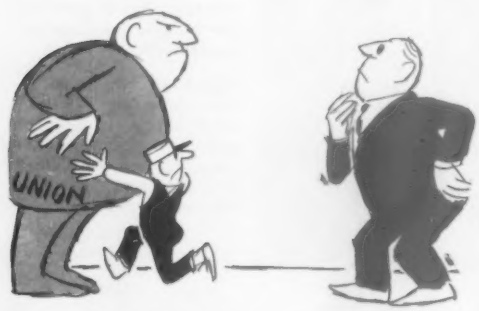
HUMAN RELATIONS

By V. E. LUNARDI, Assistant Editor, FACTORY

A "voice" raised for management

"Get it while it's hot," doesn't refer to coffee but to news at B. F. Goodrich Company (Akron, Ohio). In bargaining sessions with the union, management took a tip from union methods and installed a top-notch communications man at the bargaining table. Now letters to employees, memos to supervisors, press releases, etc., are prepared on the spot jointly with company negotiators. This way, there's little chance of misinterpreting or releasing too little or too much information.

After each day's session, a factual report is put out giving both the union and management's stand on issues reviewed that day. Management employees at each Goodrich plant involved get a copy of this report the same evening.



"Big daddy" takes rod from boss

Unions are a force that puts fear in the hearts of managers bent on disciplining employees. So strong is their influence that even non-union companies are abdicating disciplinary controls. This indirect force comes in the form of union organizing threats, labor shortages, and a growing standardization of disciplinary policies throughout industry.

The results are a general loosening of management disciplinary reins, says *Industrial Relations News* (New York), and offers these facts to support its claim:

- 90% of all disputed union contracts have an outside arbitrator.
- Largest number of these disputes concern discipline.
- The company's decision to discharge a worker is reversed or modified 54% of the time when cases go through arbitration.
- In all other arbitrations involving discipline, management is set back in 45% of the cases.

Rooting for both sides

As part of the management team, your company loyalties seem to be undivided. But don't think that you can get workers to root for only one team. They're split down the middle between company and union, according to a psychology professor-priest at Chicago's Loyola University. A 10-year study of Swift & Company workers by Reverend T. V. Purcell reveals a persistent pattern of dual allegiance. Results are to be published under title "Blue Collar Man" by Harvard University Press.

Out of 800 hour-long interviews with members of three meat-packing locals in three cities, these facts emerge: 99% of the East St. Louis, 89% of Kansas City, and 73% of Chicago workers approved of both company and union. As for the union shop, East St. Louis favored it, Kansas City did not.

On the question of strikes, pride was the reason most workers gave for striking despite company allegiance. "I don't want to be called a scab" was the way one man put it.

The majority were satisfied with the pay and working conditions, but many feared automation. Only half believed their chances for advancement were good. Among the Negroes, less than a third felt they had equal opportunities for advancement.

Paper Munitions for Mideast

Sperry Gyroscope Company (Great Neck, N. Y.), missile builder, believes that blasting off ideas is the only sure way to make friends in the Middle East. It's sending tons of technical and engineering magazines to libraries and universities in this information-starved area. All employees are cooperating in this "people to people" campaign to offset the lack of American scientific journals. Currency restrictions and high U. S. publication costs greatly limit number of these periodicals. But there's no dearth of Soviet literature.

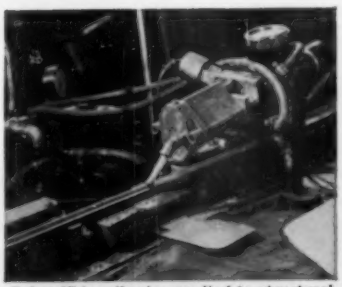
Turn the page

How FRUEHAUF rolls 'em out stronger, lighter

...with adhesives based on THIOKOL polysulfide polymer

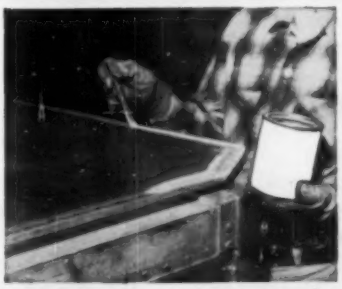
Fruehauf Trailer Company adapts the unique bonding action of polysulfide liquid polymers in a unique way. Polysulfide-base compound is used to join 1-piece roof top to roof bows. Result: roof span is lighter, stronger, and completely weathertight. Rubbery cushion between roof and structural members helps absorb shock of road travel. The use of polysulfide, for the first time, permits bonding of bows and roof sheet for greatly increased structural strength. This is another outstanding example of the industrial applicability of adhesive and sealing compounds properly formulated with THIOKOL polysulfide polymers—and of the benefits that accrue.

For further information about how THIOKOL polysulfide polymers serve industry, and how they may help you—write to THIOKOL on your letterhead.

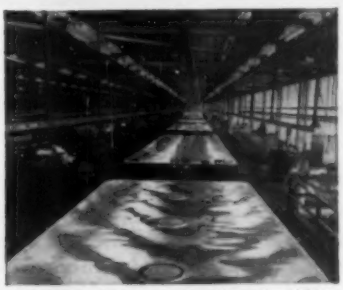


Polysulfide adhesive applied to structural cross-members by machine.

Cross-members held in place to trailer top sheet by cured sealing compound.



Providing extra seal at roof corners by brushing on polysulfide-base compound.



Skylights also sealed with polysulfide-type sealants as added precaution to guarantee complete weather-tightness.

Thiokol®
CHEMICAL CORPORATION
780 N. Clinton Avenue, Trenton 7, New Jersey
In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario

Not all polymers are polysulfide. When purchasing adhesives or sealants, be sure to specify THIOKOL polysulfide-base sealants. THIOKOL makes only the polysulfide polymer, not the finished product.

®Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellants, plasticizers, and other chemical products.

He increases production by making jobs easier

He air-powers production—simplifying work, multiplying output, cutting costs. When tool engineers need to speed drilling, fastening or other assembly processes, they call this Gardner-Denver man.

He's the Gardner-Denver Production Machine Specialist, an expert in automating all types of air tools. He helps design machines tailored to fit the job. He's backed by skilled craftsmen who make realities of ideas. Using simple, standard components, they build automatic machines to perform complex operations at speeds that amaze even veteran production men.

If you need a unique air tool setup to speed your production, a call to your nearest Gardner-Denver branch will bring this specialist to your plant.

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Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

For more facts Circle 491 on Reader Service Card

Begins on page 198

Ball and chain holding you back?

Men of executive caliber: Look to the home for chains that bind you to positions of mediocrity! You may be harboring a wife who's a "corporate liability" in that 10-room cottage. So says Lon D. Barton, president of executive placement firms in Chicago and Los Angeles. He's waging a losing battle to emancipate executives from domination by immature, status-loving wives.

How do wives weave their insidious traps? They become vice presidents of the PTA, members of the local country club, and a social group. When a man's promotion depends on relocating in a new community, the wife turns thumbs down on the idea. Once entrenched, she can't stand the prospect of sacrificing all those status symbols to begin again at the bottom in a new community. So the other fellow gets the promotion. And our man gets passed over after the second or third refusal.

Barton's advice to budding executives: Master your home situation first. Then you can successfully get ahead in business. Although there's a woman behind every man, some are pulling on the reins instead of giving full head.

Labor hangs out medical shingle

Management may be losing another battle with labor —this time on the employee-benefit front. Now labor is going into the health insurance business with a medical care plan to compete with Blue Cross and Blue Shield. Limited to the Detroit area, this plan will be directed by the Community Health Association (CHA), a non-profit organization headed by UAW President Walter P. Reuther. Members (limited to UAW) will pay a flat monthly rate, higher than the sliding scale in effect at Blue Cross, but benefits will be substantially broadened.

Except in emergencies, patients will be treated at the CHA hospital and must use services of CHA doctors. Plan will pay for hospital and doctor bills, including home and office calls, and home nursing services. Periodic health check-ups and immunizations will be free to members along with x-ray and lab tests, electrocardiographs, and other services.

Turn the page

SEE IT WHEN IT

HAPPENS!

PHILCO CLOSED CIRCUIT TV
has many applications that will speed production, control operations, improve communications, increase security *in your plant!*

Industry is rapidly adopting closed circuit TV to speed operations and reduce costs by enabling management and operating personnel to "see it when it happens"! Philco's broad experience in CCTV will help you to make the most efficient use of this modern and flexible business tool. Philco has pioneered in fully-transistorized equipment that provides maximum reliability and freedom from maintenance. It is as easy to operate as your home TV. Write today for your free copy of the Philco Closed Circuit TV System Planning Guide.

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For industry, institutions, public buildings.

A helpful, up-to-date handbook for anyone responsible for property protection. It's a valuable guide for management; a complete down-to-earth, pocket-size manual for your guards.

30 pages, filled with useful information and protection hints, including such subjects as:

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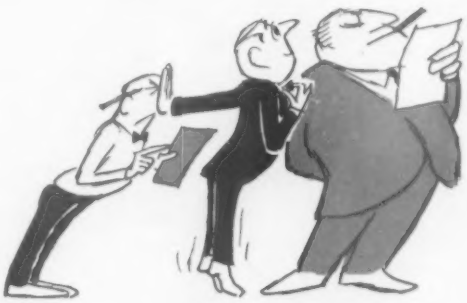
Dept. F-11 76 Varick Street New York 13, New York

Begins on page 198

If the Detroit program succeeds, the UAW may sponsor the plan in other cities, and not limit it to UAW members.

Significance: If this plan succeeds, it may mean for management the loss of another feather in its benefactor cap.



A snub for a smile *(from boss)*

Apple-polishers are weak links in your supervisory chain. Top staff men who are always looking up for a smile from a superior are second-rate supervisors. Research to confirm these findings was conducted by Assistant Professor John B. Coyle of the Michigan State University Labor and Industrial Relations Center, Ann Arbor. He defined a top supervisor as a man with strong, well-thought-out convictions, both in ethics and economics, who is willing to sacrifice job before principles.

Errors break contract ice

Next time you make a bargaining blunder, soothe yourself with this comedy of errors committed by a babe in the industrial relations woods.

In drafting a first contract with a major union, management of a Midwestern plant dictated to a girl unfamiliar with industrial relations jargon. The draft reached the negotiating table without having been proofread. Here are some of the provisions set before the union team:

"Each employee shall have the opportunity to cancel his authorization for dues deduction and if not *revolted* it shall remain in effect for another year."

"During the course of this agreement, the union will not conduct a strike and the company will not conduct a *lookout*."

On the question of selecting an arbitrator, company proposed choosing one from panel offered by the "Federal Mediation and *Consolation* Service."

The last laugh was on the company which proposed that it "shall have the right to have a shutdown vacation if in its *slow* judgment such action seems desirable."

Another first from Standard Conveyor

New continuous vertical conveyor revolutionizes floor-to-floor movement

Escaveyor self-loads, self-unloads, lifts products straight up or down without tipping or jarring. Provides smooth up, down, or reversible service.*

How Escaveyor speeds production. Here is the answer to your big need for a fast, continuous flow of commodities from floor to floor. Escaveyor moves commodities at a steady rate of 8 to 10 loads per minute.

How Escaveyor saves space. Escaveyor lifts packaged or unit commodities rapidly from floor to floor with the continuity of a belt conveyor. Yet your product always rides level. And look at the huge saving in space! It takes even less floor space than a conventional monostrand or straight-lift conveyor! Escaveyor's size is tailored to fit your package.

How Escaveyor costs less. Escaveyor actually costs less to purchase and install than practically any other type of lift. It requires less manpower because no manual loading or unloading is required. You also save many square feet of valuable floor space.

Free brochure. Send for free Escaveyor brochure! It tells how Escaveyor works, and how it can solve vertical material handling problems for *you!* Get your copy from Standard Conveyor Company, Dept. G-11, North St. Paul 9, Minnesota, or from your nearby Standard Conveyor sales representative.

*patent pending

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Consult your Yellow Pages

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For more facts Circle 495 on Reader Service Card ➤

ALL SIZES, ALL BODY PATTERNS FOR ALL APPLICATIONS

BALANCED VALVES
— for air, steam, water, gas. Designed for applications where close control is required, where pressures exceed those of single-seated valves, and where tight closing is not required. Double-seated construction, approximately 98% tight closing. Sizes ½" to 14". Wide choice of models, capacities and operating features.

COIL VALVES
— for medium pressure steam, liquid, air or gas. Long-life molded rubber diaphragms. ½" to 6" sizes. Body patterns and features for many applications.

CONVECTOR VALVES
Compact size for installation in confined spaces, inside or outside convector enclosures. Models for low pressure steam, hot and cold water. All models have "Sylphon" metal bellows operators. Sizes ½" and ¾".

LIQUID VALVES
— for low pressure hot or cold water service. Choice of molded rubber diaphragms or seamless "Sylphon" bellows. Removable tops. Wide choice of features and body patterns. Sizes ½" to 8".

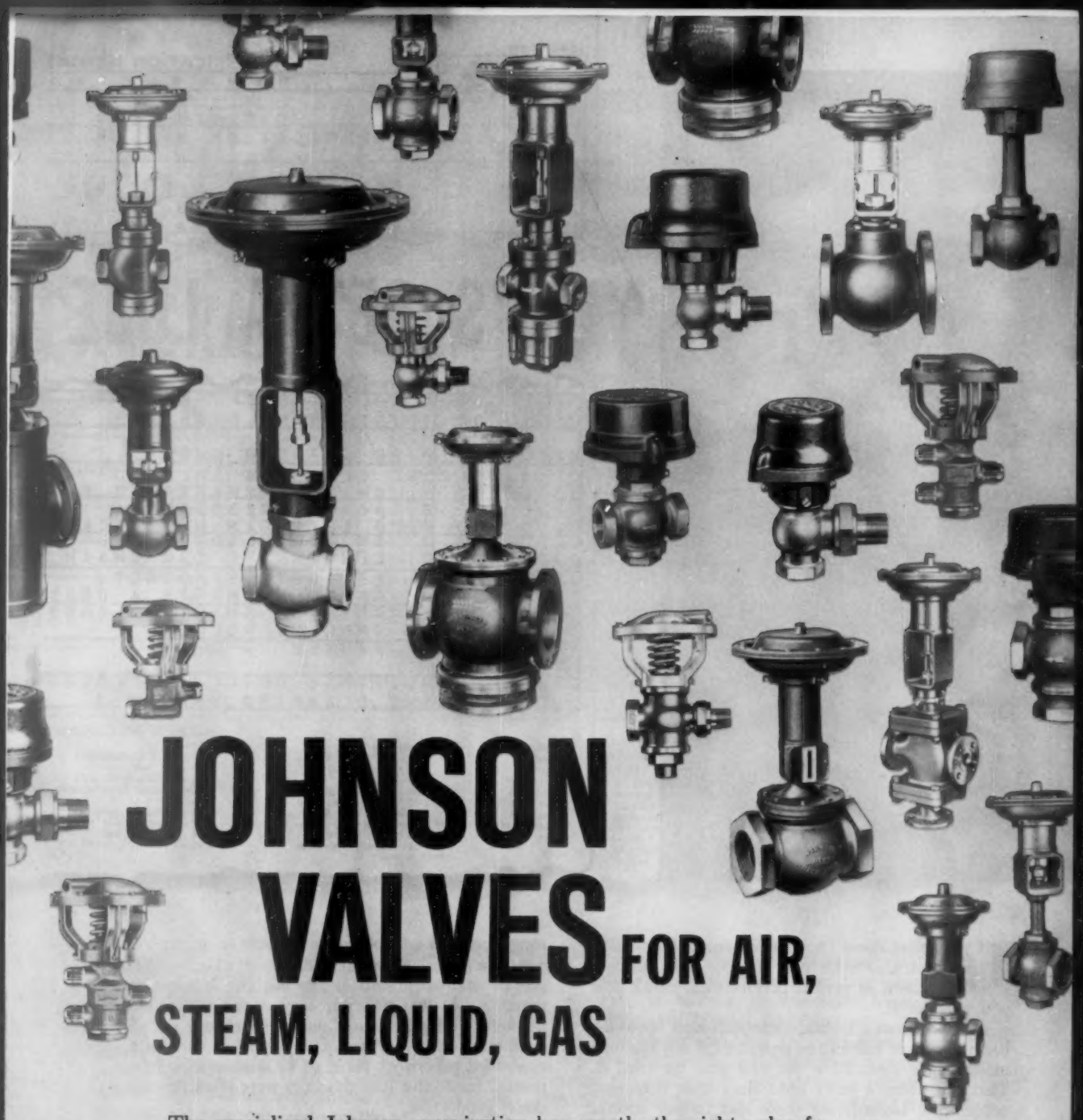
MIXING VALVES
— for applications requiring the mixture of liquids at different temperatures under control of a thermostat or humidostat. "Sylphon" and rubber diaphragm operators. Removable tops. Available in ½" to 10" sizes. Body patterns and operating features for every application.

BY-PASS VALVES
— for control of liquids over a wide range of temperatures and pressures. Sizes ½" to 6". Models available with 100% tight shutoff. Removable operators.

WATER VALVES
— especially designed for use with small room air conditioning and heating units. High grade bronze bodies. Rubber diaphragm operators. Corrosion resistant throughout. V-ring self-sealing packing assures positive seal. Renewable composition discs. Sizes ½" and ¾".

STEAM VALVES
— for control of low pressure steam. Rubber diaphragm or seamless "Sylphon" operators. Renewable composition discs especially compounded for steam service. Sizes ½" to 10". Choice of body patterns and features.

BRINE VALVES
— for control at pressures up to 50 psi. Cast iron or bronze bodies. Rubber diaphragm or "Sylphon" operators. Renewable discs, especially compounded for brine service. Removable tops. Sizes ½" to 8" in a variety of body patterns.



JOHNSON VALVES FOR AIR, STEAM, LIQUID, GAS

The specialized Johnson organization has exactly the right valve for every possible air-conditioning, heating, or ventilating control system application. In fact, Johnson makes the most complete line of pneumatic equipment in the industry — for solving any problem of temperature, humidity, or pressure control.

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- ☐ Send your new condensed catalog of all types of Johnson Pneumatic Control equipment.

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ACIPCO # 688

MACHINE CODE AREA	MACH. NUMBER	LUBE POINT	LUBRICATION REPORT DESCRIPTIO
			JUNE 8TH 1959
			LUBRICATION MASTER LI
01	001	0001	PIPE ELEV C/L RUN F4920
01	001	0002	1MC ENAMELINE A34
01	001	001	1 4 3/4 IN HYDRAULIC CYL
01	010	001	4 ROLLER SHAFT BRGS
01	010	002	2 INT SHAFT BRGS
02	002	0001	PIPE GRINDER F4874
02	002	0002	1MC CLEANING SHED A33
02	002	001	6 GRINDER SHAFTS 12 BRG
02	002	002	2 ACIPCO REDUCERS
02	002	003	2 3 15/16 IN HYD JACK P
02	002	004	2 18 TOOTH SPROCKETS
02	002	005	2 LENGTHS RC 120 CHAIN
02	002	006	2 13 TOOTH SPROCKETS
02	002	007	4 GRINDER SHAFTS 4 BRGS
02	002	008	4 GRINDER SHAFTS 8 BRGS
02	002	009	80 TROLLEY ROLLERS
02	002	010	2 VALVES
02	015	0001	MULTIPLE DRILL 3 PRESSES
02	015	0002	1MC CLEANING SHED A33

Type of Bearing	Lubricant Code	
1 — Ball	01 — Moly — M. P	10 —
2 — Roller	02 — Retinax — C	11 — D. T. E. Medium
3 — Brass	03 — Texol — F	12 —
4 — Babbitt	04 — Meropa — #3	13 — Esso — H. D. #30
5 — Steel	05 — Puropalo Rx — Sp. Hv.	14 — Sinclair Opolene #40
6 — Cast-Iron	06 — Poco Gear Shield — A	15 —
	07 — Purol — 10 — W — 30	16 — Texaco Capella Oil
	08 — Purol — #40	17 — Fibrax #370
	09 — Puroco — Medium	18 — Senate #158
		19 —

"LET'S GET A LUBE

If your plant doesn't have an organized lubrication program, this is for you. If your lube men are falling short of perfect performance, here's how you can get it.

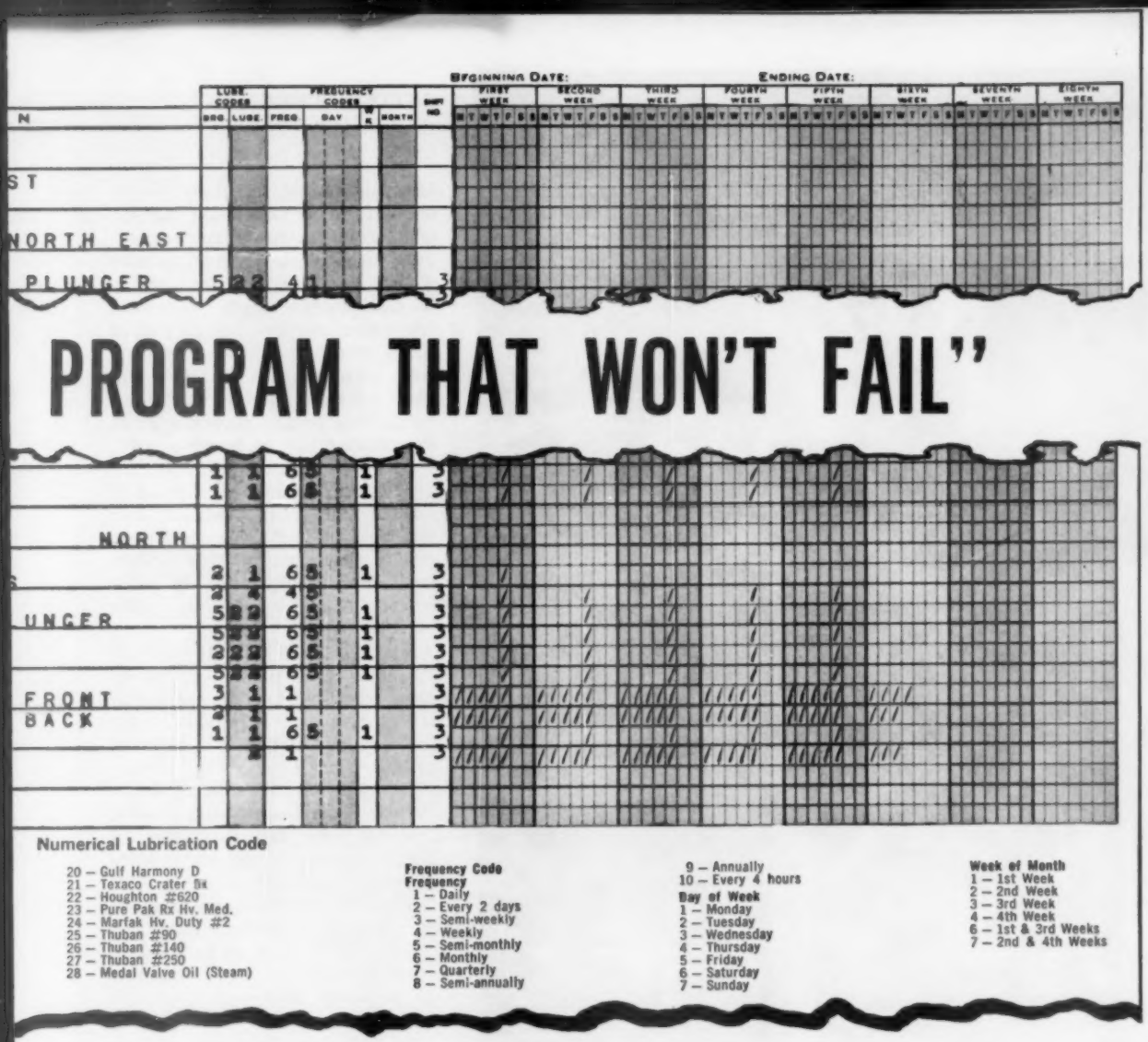
A switch from a hit-and-sometimes-miss approach to an organized lubrication program cut our machine maintenance costs 20% the first year we tried it. That was some 4 years ago. Since then continued refinements are insuring these and further savings each year. Machine failures due to poor lubrication are down to practically zero. This sort of performance calls for near-perfect lube practices.

We achieve them with this 3-part program: (1) a carefully-planned lubrication schedule, (2) a trained lubrication crew, and (3) good lubrication equipment. Actually, there is an unseen fourth element to this program that must not be overlooked. It is top management approval of the lubrication objectives and its backing to the hilt in providing the men and equipment and administrative controls to do the job right. In fact, it was a top management directive that got us started toward improving our lubrication practices. At that time our eight or ten lubrication mechanics conscientiously made the rounds on all equipment. But very few of the activities were on a controlled paperwork basis, so we were missing lube points. Ineffective lube practices were often slowing down production.

The ACIPCO plant (short for American Cast Iron Pipe Co.) normally employs about 2250 people. Principal products are cast-iron pipe in 16- and 20-ft. lengths ranging in diameter from 2 to 48 inches. Some 20 non-contiguous buildings cover about one million square feet, contain about 1200 pieces of machinery.

Such operations can be a lubrication headache. Before our new program, lubrication failures in the dry and dusty foundry atmosphere, for example, were causing an undue share of breakdowns. Apparently, conscientious manpower effort wasn't enough. It was then that our works manager F. H. Coupland decided to jack up the program. "Put it on a scheduled basis"

By CARL P. FARLOW, Chief Engineer
American Cast Iron Pipe Co., Birmingham, Ala.



PROGRAM THAT WON'T FAIL"

was his conclusion. That was the starting point of our three-part program.

Reliable Lubrication Schedule. This is the backbone of our program. Our schedule is based on standard 80-place master punched cards and our IBM mechanical tabulating equipment. Prime purpose of this equipment at ACIPCO is for accounting and production control. But we were able to shoe-horn in on available machine time, and gain the advantages of a tab control.

Here's how the lube schedule was developed:

1. Plant survey. The lube foreman took an inventory and assigned machine numbers in each of some 60 geographical areas. Each area was coded by a 2-digit number (beginning at 01). Each machine unit was coded by a 3-digit number (beginning at 001). A typical machine number might read "29003", signifying it's the third machine in area 29.

2. Lube survey. Next step was to get drawings of all machines from our engineering department. Purpose was to determine type, number, and location of all lube points, and their lube requirements. (This survey uncovered lube points that had been previously overlooked.) Here also a numerical code was adopted for: Type of bearing, recommended frequency of lubrication, and type of lubricant.

3. Set up master schedule. This was simply a matter of putting together the data gathered in previous steps, under the guidance of the tabulating section head. A master punched card was made up for every type of lube point for every machine. The results are shown above—a small section of the first page of the master schedule. Each line represents the data on one punched card.

The schedule is easy to interpret. Take machine 02002, pin-pointed by the arrow, for example. This is a pipe grinder (drawing number F4874) located in our Mono-Cast (MC) cleaning shed in area A33. It has 10 types of lube points. The first type (grinder shaft bearings, 12 of them) are roller bearings (Code #2) requiring grease lubricant (Code #1) monthly (Code #6) on each Friday (Code #5) of the first week (Code #1) during the third shift (Code #3). All other lube-point items can be interpreted the same way.

Many years of sound engineering and field testing are built into the advanced design of all Furnas Electric products, to provide the leading motor controls on the market today.

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Non-tracking, impact-resistant material. Deep arc chambers. Visible and front removable silver-cadmium oxide contacts.

CROSS ARM ASSEMBLY

Molded of high-impact material for millions of operations. Stainless steel contact springs. Special alloy contact backing and guide posts provide superior bearing surfaces.

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BATAVIA, ILLINOIS

BETTER LUBRICATION

Begins on page 206

In administering the program, we obtain from our tab section four sets of the complete run of master cards every eight weeks. Each set includes a master schedule plus a schedule for each day of the week. Thus each lubrication mechanic will get a set of sheets that he can work from each day. To accomplish this, the entire plant is divided into four assignment areas, three equally proportioned as to workload, and the fourth to cover all mobile equipment—trucks, cars, diesel cranes, and so on. One set of schedules is broken down into four area books. Of the remaining three sets of schedules one goes to the lube foreman, another to the maintenance superintendent, and the third is a spare.

The split-up area books are kept by the lube mechanics and passed along from shift to shift. Each shift marks the jobs it is responsible for (by a cross-hatch) with a different colored pencil. Originally, lubrication was set up on a six-day, three-shift basis. Production later dictated a change to five days, two shifts. We merely rearranged the schedule to distribute the workload evenly over this revised work-week, and made up a new set of punched cards. The original set is kept at hand for a quick change-back should we ever revert to that basis.

This easy change-over highlights a big advantage of our tab system—flexibility. It's easy to make changes. Let's suppose the lube foreman decides that a certain machine needs weekly instead of monthly lubrication. Or that a different lubricant should be used. Or perhaps a new machine has been installed. All he needs to do is have the tab section make up a corrected or new punched card. Then the up-dated instruction will appear in the next 8-week's set of lubrication schedules. If he needs a corrected sheet earlier, even that can be obtained. Ordinarily minor changes can be more easily penciled in on current schedules. Incidentally, our lubrication frequencies are continually being changed to balance the lubricants used with the work the machine has to do. This contributes to lowered lubrication costs.

A well-planned schedule, of course, is nothing more than a set

Electric Trucks COST LESS TO OPERATE

Battery-powered electric trucks save in the three most important areas of cost breakdown: maintenance, fuel and depreciation. The electric truck effects economies in power and maintenance costs so substantial that their overall cost per ton-mile is less than half that of other types of trucks.

Add lower operating costs to a convincing list of other benefits—maneuverability, clean, quiet and safe operation, less maintenance—and you can easily see the main reason why users prefer battery-powered electric trucks for modern, efficient materials-handling jobs of all types.

Electric truck users generally agree on one other point, too—Gould Batteries for longer life. With the new Silconic Plate, Gould Batteries offer up to 25% longer life.

Join the list of users who prefer this ideal combination of electric trucks and Gould Batteries. For more information, write or call your local Gould representative. Ask for booklet "Why We Use Battery-Electric Industrial Trucks." Gould-National Batteries, Inc., Trenton 7, N. J. In Canada, write to Gould-National Batteries of Canada, Ltd., 1819 Yonge Street, Toronto, Ontario.

More Power to you from **GOULD**

For more facts Circle 497 on Reader Service Card

Another Tool Answer
by Snap-on

New Bung Starter Socket

Got a tough tool problem? Try SNAP-ON for the solution. Take this new SNAP-ON bung starter socket, for example. It fits practically any bung you'll find — on grease and oil drums; containers for chemicals, solvents, etc. It eliminates wasted time, damage to bungs and drums, and the skinned knuckles you get with makeshift tools. This socket will pay for itself over and over.

Fits every bung we've tried

The above photo is typical. Bungs come in a wide variety of sizes and types with many different styles and shapes of turning flanges. This socket handles every one we've checked.

Use this bung starter socket with any ½-inch drive wrench handle or impact wrench. Order a supply from your SNAP-ON representative. He will be happy to serve you for any of your tool requirements — work with you on tool-use problems, or place at your disposal SNAP-ON's creative engineering service. He's a hand tool specialist with wide experience. Call your nearest SNAP-ON branch or write us.

Here a worker removes a bung quickly, easily. Socket fits around the outside circumference of small bungs, the inside circumference of large bungs, enabling the specially shaped housing or spring-loaded tongue to engage the various bungs.

FOR ALL INDUSTRY
SNAP-ON TOOLS
8044-K 28th AVENUE • KENOSHA, WISCONSIN

BETTER LUBRICATION
Begins on page 206

of objectives. Achieving these objectives requires both men and equipment suited to the job. A brief look at each one shows why the lubrication schedule is met so smoothly.

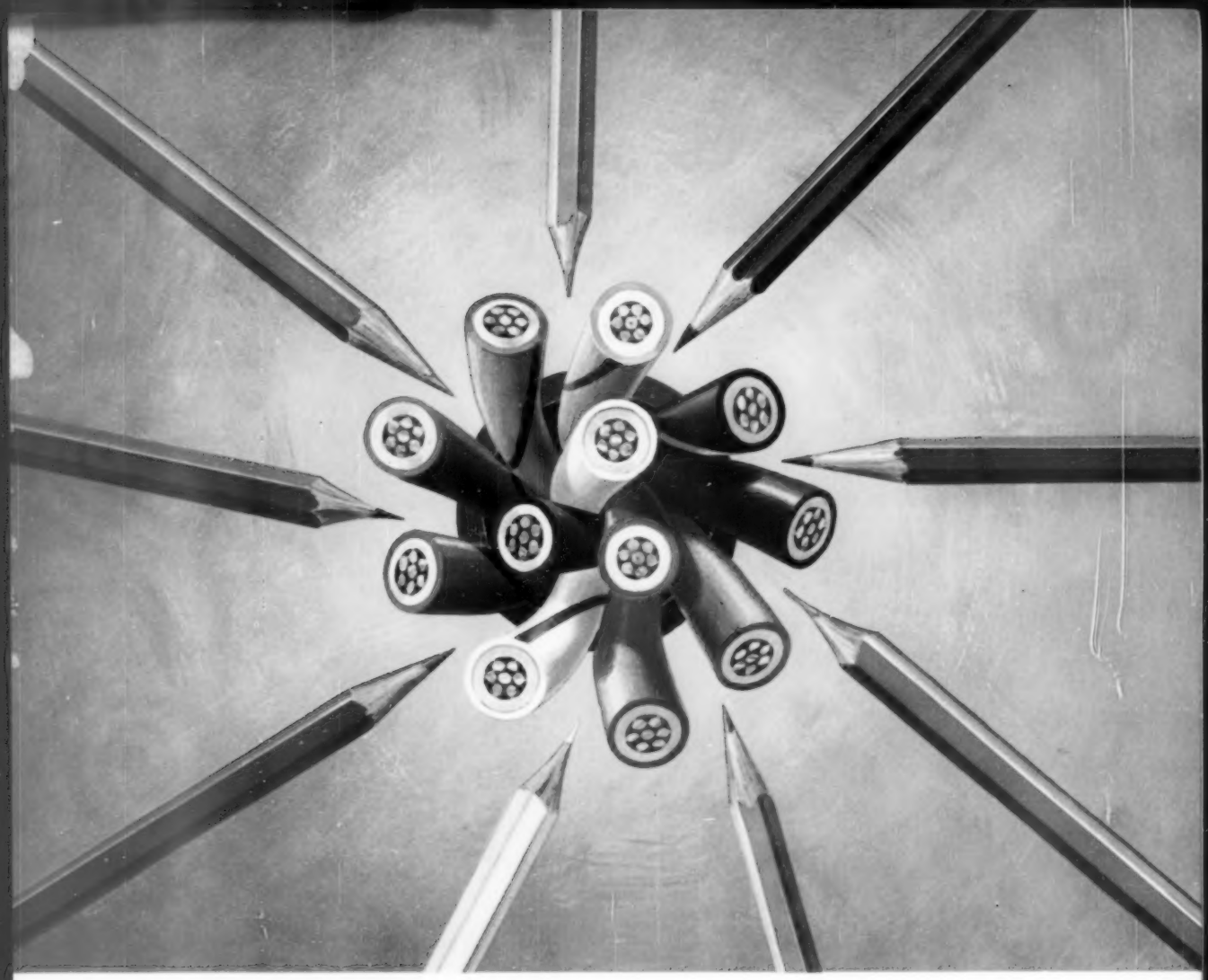
Trained Men. To reorganize the lube program, we selected a man from general maintenance work to become a full-time lubrication foreman. He reports to the maintenance superintendent. He studied the problem in detail, immersed himself in lubrication know-how, and spearheaded all moves in the program. Today he sums up his convictions about lube mechanics this way: "The lube mechanic is the one who makes this lube system work. If he is not a conscientious worker, the job will not be done as it should. Of course, any lube mechanic could mark the schedules as though he had done the work, and skip lubrication for a few days. Then the increased maintenance would finally disclose he was slipping up on the job. There's only one answer to that—a reliable man who will carry out the schedule instructions, thus avoid these costly tieups or repairs."

This is why we adopted the policy of using men for lube mechanics who have worked in our maintenance department. They are paid the same rate as regular maintenance men. They can spot incipient trouble as they lubricate. And since they see the equipment more often than a maintenance man, they catch trouble faster. This helps backstop the preventive maintenance program and prevents costly downtime. In such cases the men fill out a standard work request on equipment needing repairs and advance it to the lube foreman. From there it goes on to maintenance.

Good Lubrication Equipment. This is the final important element in our program. Management at ACIPCO has seen to it that we acquired all the necessary facilities and equipment needed for an efficient job. At present we have a new central-storage building with an office for the lube foreman. Our lube transportation equipment includes a Payloader, a jeep, and a portable air compressor. Other equipment: a centrifuge for cleaning oils from hydraulic oil

Turn to page 214

For more facts Circle 498 on Reader Service Card For more facts Circle 499 on Reader Service Card ➤



DRAW YOUR OWN CONCLUSIONS

about the versatility of this new, standard control cable from Rome

Start by listing all the factors you consider important in a control cable.

Then compare your list with what Rome's new standard control cable (designated as the CT line) offers. We sum it up in one word: *versatility*—the ability of this new cable to meet most of your control cable needs.

For example, you can use CT cable with either AC or DC circuits. For voltages to 600 there's Type B; to 1000, Type C —both in accordance with new IPCEA-NEMA standards.

How about number of conductors? Specify from 2 to 37, in No. 10 or No. 12 AWG copper. Each conductor is insulated with polyethylene to give you maximum performance in a dielectric material, particularly where *moisture* is a problem. This insulation also stands up to acids, alkalies and oils. So CT is well suited to use in *hazardous* environments.

Over each insulated conductor you also have a Synthinol (polyvinylchloride) jacket. This same material is used to jacket the entire cable. Result: *added* resistance to heat, chemicals, and corrosion. And, good mechanical protection for the insulation, as well as a flame retardant barrier.

Full color coding (in keeping with IPCEA-NEMA, Method I) means you can make correct connections, quickly. And it will save you money in testing and maintenance.

Flexible, clean and light in weight, CT cables are also *smaller* in over-all size than similarly rated rubber-insulated cables. Use smaller conduit and fittings. Put more conductors in existing conduit, or use it in tray or trough.

All the facts and figures about the versatile *new CT cable —including what sizes are available "off the shelf"—are summed up in a 4-page booklet. For your free copy, write to the Rome Cable Div. of Alcoa, Dept. IN-100, Rome, N.Y.*

Special requirements? As a cable specialist, Rome can answer any of your control cable problems not met by this standard construction. Ask your Alcoa-Rome salesman for details.

ROME CABLE
DIVISION OF **ALCOA**

5 KV ? 15 KV ?

HIGH-VOLTAGE CABLES—IN THE LENGTH YOU NEED—NOW AVAILABLE "OFF THE SHELF"

Today, you can order the length of high-voltage cable you need—for fast "off the shelf" delivery from Rome.

It's possible because of our new stockpiling program.

Not only does this solve your *supply* problem, but it also assures you of top *quality*, which is so critically important in high-voltage work. These are the same Rome cables that have earned their reputation the hard way: through miles upon miles of high-voltage jobs over the years.

Popular Sizes. 5 and 15 kv Rozone Roprene single-conductor cables are currently being stocked at Rome in the sizes most frequently needed.

This gives you a quick answer to a wide variety of cable problems. Rozone is a versatile, long-life insulation that resists ozone and moisture. Roprene is tough neoprene jacketing that resists weather, fire, oils, chemicals, heat and aging.

Ready Now. You can take advantage of this convenient new stockpile *now*. Your Rome distributor is the man to call for 5 and 15 kv cable. Ask him about it this week.

Rome Cable Division of Alcoa, Rome, New York.

ROME CABLE
DIVISION OF **ALCOA**

ALLIS-CHALMERS LIFT TRUCKS keep *Moving* and *Paying* at Vendo

Vendo is one of the world's largest producers of vending machines. Obviously, many of its products are pressed into service without ever leaving the plant. The Allis-Chalmers lift truck is one of 14 in use at this plant.

Operator John Cromer reports, "I like the way an Allis-Chalmers lift truck performs. I like the transmission. I like the way it handles. I just like the whole machine!"

Four years ago, The Vendo Company put an Allis-Chalmers lift truck to work in its Kansas City, Missouri, plant — and discovered there *is* a dollar-saving difference in lift trucks. As Clyde Hickman, material handling foreman, said then, "A lift truck has to keep moving or you lose money, and ours keep moving."

Clyde Hickman, material handling foreman, says, "these A-C trucks keep moving."

When reminded of this statement recently, Hickman answered, "What I said then still goes — only more so. We now own 12 Allis-Chalmers trucks and operate two others on a rental basis. That original truck has close to 13,000 hours and hasn't needed an engine overhaul — neither has any of the others."

The man responsible for keeping this fleet on the move is Clyde Dent, mechanic. He takes this responsibility seriously. When a truck is pulled in off the job, it gets real "pit stop" service. Here Allis-Chalmers' easy accessibility really pays off. As Clyde described it, "When a lift truck comes in for minor service, we usually get it back on the job before the exhaust pipe cools off, and I've got burns on my arm to prove it!"

Clyde Dent, mechanic, says, "maintenance expenses are low."

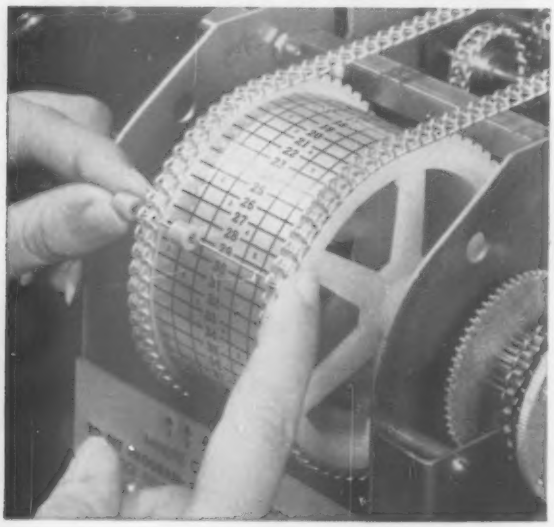
Let your Allis-Chalmers dealer show you how these tough trucks will keep going, and paying, on *your* job. Ask for a demonstration. Allis-Chalmers, Milwaukee 1, Wisconsin.

BH-149

ALLIS-CHALMERS power for a growing world

HOW TO

SET A SIGNAL PROGRAM SCHEDULE



THE EASY WAY WITH A Cincinnati CLOCK AND PROGRAM SYSTEM

Push a roller on a pin—Your signal is set. It's that simple with a Cincinnati System! Anyone can set a signal program schedule in minutes. No tools are required. And, pins and rollers are re-usable.

Contrast this simple procedure with any other system.

You'll also find features like wall or flush mounting and the exclusive swing-out construction make a Cincinnati System simple to install and maintain. There's also an automatic 12 hour reset correction and spring reserve to help overcome power failure and assure continuous, accurate signal and clock operation.

Get the complete story by contacting your nearby Cincinnati representative; or, send for your free copy of the "Time Systems Handbook" covering "Clock and Program" and "Fire Alarm" systems.

IF IT'S ABOUT TIME . . . CALL FOR . . .

THE Cincinnati TIME RECORDER CO.
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SINCE 1896

Gentlemen:
Without charge or obligation, please send my new "Time Systems Handbook."
—A basic guide to clock and program systems.

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Address_____
City_____ State_____
Organization_____ Position_____

systems and lubricating oil systems, and a lubrication pit, with good lighting, for mobile equipment. Lubricants are piped to this pit—no messy containers.

As we continue in our lube program we are installing new automatic lubrication devices on new equipment—especially fog systems, pressure lubricating systems, and automatic grease systems. Hard-to-lubricate machines are being piped for safety as well as convenience.

We also maintain a complete inventory of spare lubrication parts. Control will soon be handled by mechanical tab punched cards. This includes all automatic lubricating devices, hand guns, fittings. Four years ago we were regularly using 12 oils and 8 greases. Now 8 oils and 4 greases are doing the job, with a further cut in view. This does not include special little-used lubricants.

YOUR POSTMASTER'S SUGGESTIONS

- Avoid the avalanche of Last minute Holiday mailings
- To assure prompt delivery of all Christmas parcels and greeting cards before the Holiday... Mail early
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- For delivery in your local area, Mail before December 16

You can't afford to lose track of a trouble-shooting maintenance man. Now you can find him instantly ... in the stockroom, the cafeteria ... even out in the yard – way out of reach of any normal call system.

You reach him unobtrusively and privately. Only *his* pocket-size, transistorized PAGEMASTER® receiver picks up the call signal which goes on repeating until he answers.

Fool-proof, fast and flexible PAGEMASTER® Selective Wireless Paging System offers substantial economic advantages. There are no costly cable, speaker or light installations. Maintenance and operator-time costs are minimal.

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Remember . . . your Stromberg-Carlson Communications Consultant is only a local phone call away from you. He will be glad to analyze your communications problem and give you every possible help without obligation.

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A DIVISION OF **GENERAL DYNAMICS**

"Here at HONEYWELL we're control men

Honeywell
H First in Control

"We have a basic philosophy here at MINNEAPOLIS-HONEYWELL. As control specialists, we've learned that it is our *specialist's approach* to design, installation and service that enables our controls and instruments to do their best in operation.

"We feel the same way about elevators. We have 4 OTIS Passenger Elevators and 6 OTIS Freight Elevators in our Minneapolis plants. We know that they'd end up as strangely *mixed breeds* if we attempted their maintenance—because a careful study of the OTIS *specialist's approach* to maintenance has convinced us that only OTIS can keep our elevators running like new."

What is the OTIS *specialist's approach* to elevator maintenance?
It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long OTIS training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdown to an absolute minimum and assure the highest possible safety.

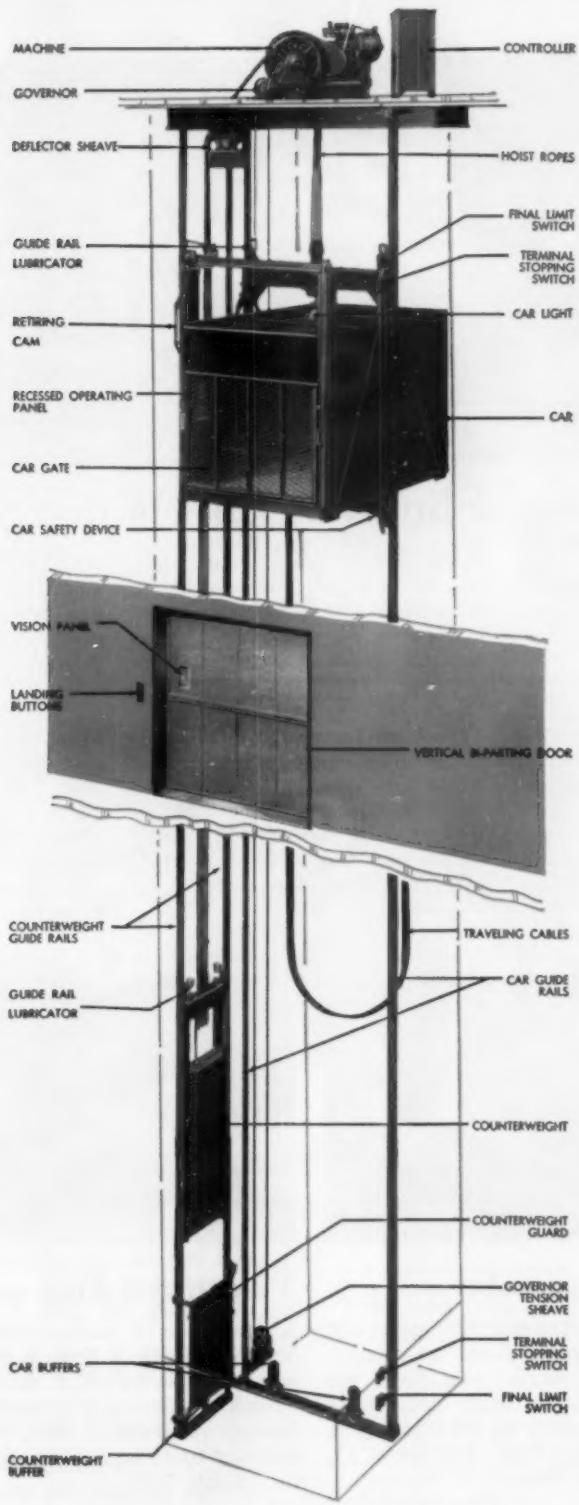
elevator maintenance

THAT KEEPS ELEVATORS RUNNING LIKE NEW

Otis

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

. . . not elevator maintenance men"



For more facts Circle 503 on Reader Service Card

FACTORY MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

These pre-finished building sheets don't stain

Decorative asbestos-cement sheets, pre-finished with permanent coloring, can be used as curtain walls, partitions, siding, and roofing. They come in ribbed, corrugated, or flat shapes with a hard, smooth finish said to have five times the life of ordinary paints. This finish is not harmed by most common staining materials including ink, grease, lipstick, pencil, and coffee. It is scratch- and abrasion-resistant, and sheets can be power drilled and sawed easily. *Keasbey & Mattison Co.* (Circle 195).

196—Liquid Organic Biocides for industrial cooling water are highly effective against harmful organisms, yet are quite low in toxicity to humans. They come in four formulations and are readily soluble in all types of industrial water. *Dearborn Chemical Co.*

197—High-Temperature Alloy offers excellent oxidation resistance at a cost lower than the exotic metals. Tests of Alloy No. 56 at 1900 F. showed oxidation rate of only 0.024 in. per year. In sheet, plate, bar, wire, and coated welding electrodes. *Haynes Stellite Co.*

198—Wire Cloth, coated with Teflon over the entire surface, comes in mesh sizes as fine as 180 openings per in. Typical application: filtration where water is present. Teflon has a tendency to hold back the water, let other liquids pass. *Cambridge Wire Cloth Co.*

Adhesive mixes in a tube

This two-part adhesive is packaged in a small Saran tube that contains both the base material and the catalyst. The latter is contained in a smaller tube inside the larger one. Squeezing breaks the small tube, allows the two to be mixed. Called Armstrong J1158, adhesive cures at room temperature. Trial kit costs $3. *Armstrong Cork Co.* (Circle 199).

Vulcanized fibre resists flame

A new grade of flame-resistant vulcanized fiber with improved dielectric strength and arc resistance is rated non-burning under ASTM procedures D-635 and D-658. Pyronil "E" is a combination flame, heat, and dielectric barrier. Available in rolls, coils, or sheets in thicknesses of 0.010 in. to 1/16 in. *National Vulcanized Fibre Co.* (Circle 200).

Turn the page

now . . . handy smaller size . . . new features

Tote Boxes

by WEAR·EVER

Smooth, rounded, easy-to-clean corners
#24 Over-all Size: 23⅞" x 17-1/16" x 10⅜"
#24 available without handles to fit Cres-Cor Pan Rack
Exclusive Open Bead design
Stack when filled
Strong, smooth one-piece handle
Nest when empty
#35 Over-all Size: 34 3/16" x 16⅞" x 12"
Dolly available for #35 shown at left.

You asked for it . . . a smaller version of the famous Wear-Ever #35 Tote Box. It's our new #24, shown at top in the above illustration, and it's available *now*.

We've designed it particularly for you whose needs call for a lighter, smaller, easier-to-handle container. It is available without handles, to fit perfectly in a Cres-Cor pan rack.

This new box incorporates the same quality construction features as our standard size box—special extra hard wrought Wear-Ever Aluminum Alloy, sanitary open bead and extra strong, double-embossed bottom.

Like its big brother, shown in the smaller photo, this new box stacks when full, nests when empty and is available with your identifying imprint on side or end, if desired.

For full information on our complete line of food handling items, call your local Wear-Ever man, or send coupon below.

WEAR·EVER

ALUMINUM UTENSILS

WEAR-EVER ALUMINUM, INC.
WEAR-EVER BLDG., NEW KENSINGTON, PA.

Wear-Ever Aluminum Inc.
6812 Wear-Ever Bldg., New Kensington, Pa.

GENTLEMEN: *I'd like to know more about your Tote Boxes and other handling equipment.*

☐ Send me your catalog. ☐ Have your representative see me.

NAME .....

TITLE .....

Fill in, clip to your letterhead and mail today.

NEW IDEA! *Wear-Ever's new Nickel Scouring Cloth. Won't scratch, won't mar, far outlasts ordinary scouring cloths. At your dealer's.*

For more facts Circle 504 on Reader Service Card

Shatterproof Structoglas cuts building and maintenance costs for (USS) United States Steel

United States Steel saved on construction expense and assured years of maintenance-free daylighting by using Structoglas fiberglass windows in this new vertical furnace building. The strong corrugated plastic panels were fastened directly to the steel walls without sash. No painting was required since the light-filtering green tint is "built in." Structoglas is shatterproof and highly weather resistant, so that maintenance is virtually eliminated. Glaze your plant *once and for all* with Structoglas—best plastic panel under the sun. Get the PROOF.*

structoglas®

*Write Structoglas Inc., Dept. 1103, Cleveland 20, Ohio, for Glazing Folder SL-1, with proofs of Structoglas superiority and glazing details.

GUARANTEED FOR 3 YEARS

6007

FACTORY / MATERIALS NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.

201—Polyethylene Pipe Caps protect exposed end threads during painting, dipping, other processing. Deeply knurled for easy removal, color coded caps come in sizes from ⅛ in. to 2 in. Single internal thread allows push-on application. *Clover Industries, Inc.*

202—Aluminum Structural Panel is a sandwich of two flat sheets of aluminum bonded to a core of either corrugated or delta-formed sheet. When one surface is perforated, it acts as an acoustical panel. Can be ordered in a range of colors. *Reynolds Metals Co.*

203—Asphalt Coating is for application to existing blacktop driveways and parking areas to renew the surface. It comes ready to use, requires no mixing. Material will not soften or track during summer heat. Gallon covers 80-100 sq. ft. *The Philip Carey Mfg. Co.*

204—Fluorocarbon Anti-Stick Agent, in aerosol spray cans, provides a low-friction surface for wood, metal, leather, and plastics. The dry film is chemically inert, insoluble, and thermally stable to over 500 F. Sample 6-oz. cans are $2.50. *Dixon Corp.*

205—Lightweight Clamps (loop type) of polypropylene have high tensile strength and dielectric properties. Available in seven sizes (⅛- to ½-in. diameter); especially suited for stringing pipe, small tubing, wire. Free samples on request. *Holub Industries, Inc.*

Turn the page

For more facts Circle 505 on Reader Service Card

For more facts Circle 506 on Reader Service Card ➤

HALLOWELL
SHOP EQUIPMENT

Rugged, functional, versatile . . .
custom in everything but price!

OPEN BENCHES

Arrangeable, changeable, economical. Rugged construction. 4 leg heights, 4 top materials, 4 lengths, 5 widths—the widest selection in the industry. Choice of top and base accessories.

CABINET BENCHES

Functional, good looking, plenty of protected storage space. 3 lengths, 4 top materials. Many interchangeable accessories.

UNIT BENCHES

Wide variety of arrangements and accessories. Versatile, interchangeable drawer or cabinet pedestals. 2 lengths, 2 widths, 2 heights, 4 top materials.

SHOP DESKS

Large, smooth writing surface. Drawers glide on bearings. Recessed pulls. Three standard models, plus K.D. parts for custom assembly.

STOOLS and CHAIRS

Great variety. Set-up or K.D. Fixed or adjustable heights. Tubular or channel legs. Steel or Presdwood and steel seats—round or contoured—revolving or stationary. Optional foam rubber seat and backrest covers available.

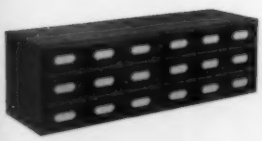
TOOL STANDS

Built to take a beating. Four sizes, with drawers, trays, cabinet bases. Drawers in single or double tiers. Available with steel or rubber casters.

INDUSTRIAL CABINETS

Floor, wall and caster models. Safe, neat storage. Flush bases, detachable feet. Steel or rubber tread casters. Six sizes from 21 to 75 in. high.

STORAGE WALLS



Use individually or stack to form storage walls or partitions. Units available with 12, 16, 18, 24 or 32 drawers.

ERECTOMATIC® SHELVING

Exclusive features cut assembly time. Each shelf can be independently positioned. Stores up to 20% more in the same space. Interchangeable parts and accessories.

STEEL SHELVING

Use basic units individually or in combination. Ledge, counter and vertical types. Multiple pierced, precision formed for easy assembly.

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"Call FOSTER for Rail"...Get Relayers PLUS

Installing or expanding in-plant trackage? Foster will deliver Quality Relaying Rail at lower cost . . . "plus" all necessary new track accessories, switch material—even the track tools to do the job. To help select the materials best suited to your job, call the Foster Track Specialist.

You will save on freight from Foster's nationwide warehouses, all of which stock all sections of relaying rail "plus" new rail for crane runways and specialized applications.

Another "plus": Foster's Track Inspection Kit, which illustrates all the elements needed for an efficient industrial siding. It's a real help for proper track maintenance.

Write **L. B. FOSTER CO.** for free Track Kit FA-11 Pittsburgh 30, New York 7, Chicago 4, Houston 2, Los Angeles 5, Atlanta 8, Cleveland 35.

Faster From Foster

Pipe • Rental Steel-Sheet Piling • Pipe Pile • Rail

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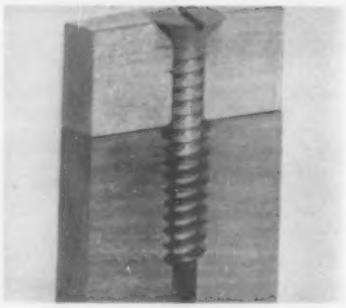
FACTORY / MATERIALS NEWS

Begins on page 218

For more about these items, circle item numbers on Reader Service Card next to back cover.



206—Wire Screw Thread Insert is a tightly wound coil for insertion into a drilled hole for the accommodation of a screw. Self-tapping insert gives up to 2½ times the holding power of standard fasteners. Kit with tools also available. *Heli-Coil Corp.*

207—Floor Resurfacer of thermosetting plastic has exceptional adhesive qualities and toughness—four times the tensile and compressive strength of concrete, ten times its flexibility. Withstands wet heat to 212 F., most acids and alkalis. *The Monroe Co., Inc.*

208—Pressure Sensitive Foam Tape of polyurethane combines fire retardant foam with self-adhesive. For cushioning, insulating, gasketing, the material is self-extinguishing when the primary source of flame is removed. *Richards, Parents, and Murray, Inc.*

209—Acoustical Ceiling Board for use with metal grid suspended ceilings is an incombustible material of gypsum reinforced with glass fibers. Comes in 24-in. square units ⅜-in. thick. Surface is washable white in flat or lightly textured finish. *Bestwall Gypsum Co.*

210—Marking Agent for use on Teflon reacts with the Teflon surface to create a dark carbon film. The treating agent, PA-746, is supplied in a squeeze bottle with a tapered, no-leak nozzle that allows it to be used as a writing "crayon." *Plastic Associates.*

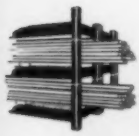
Turn the page

EMI

GET EXACTLY WHAT YOU WANT FROM THE MOST COMPLETE RANGE OF STORAGE AND MATERIAL HANDLING RACKS IN THE INDUSTRY!

Air-Row Head fully adjustable pallet racks.
SNAPS IN, LOCKS IN, NO LOOSE PARTS!

Coil and reel racks



Bar, pipe and tube racks

Stock boxes –solid or KD

Portable stacking racks

If you have a special problem, we will design racks to your exact specifications.

METAL WORKING FACILITIES

EMI offers complete metal working facilities including tubular, structural and special shapes.

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Write for our complete catalog!

EQUIPMENT MFG. INC.

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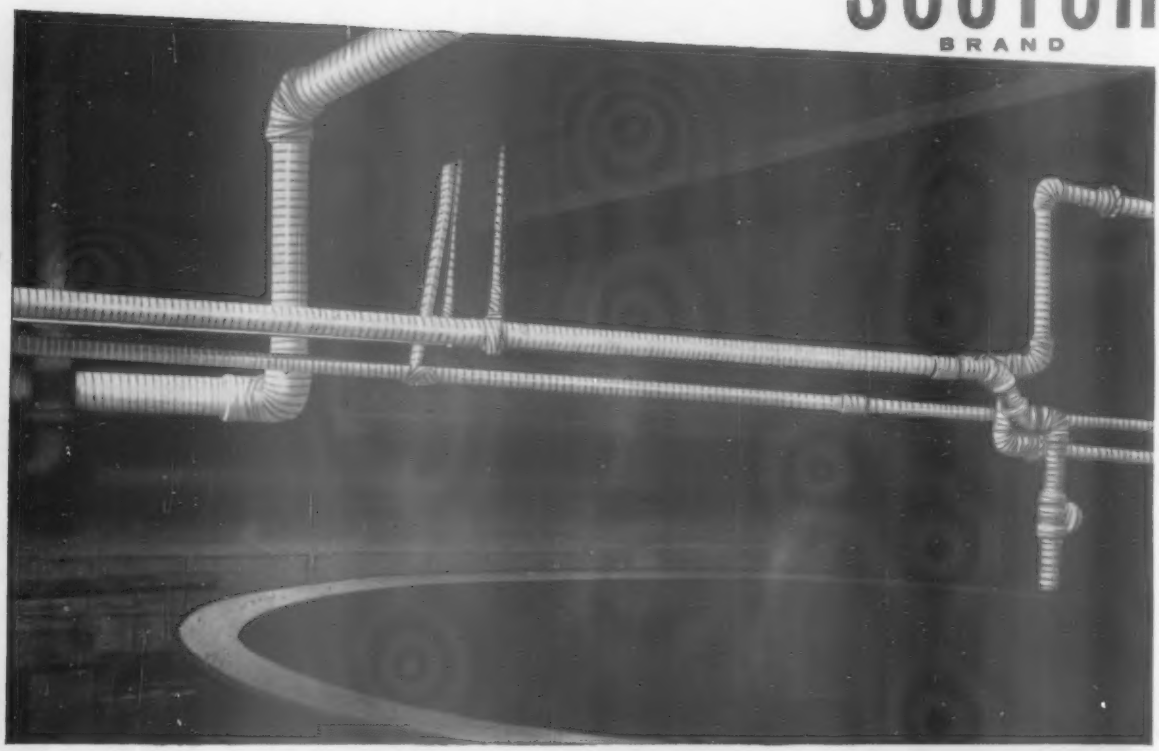
SCOTCH BRAND



TAPEnology... industry's newest cost-cutting tool

PLASTIC TAPE GIVES PIPES ANTI-CORROSION PROTECTION

Now you can stop pipe network corrosion before it starts . . . fast, too, with wrappings of pressure-sensitive "SCOTCH" BRAND Plastic Tapes. Tape provides an air-tight moisture-vapor barrier that guards against corrosion or deterioration from acid laden fumes; is also resistant to oil, water, caustics, greases, and most commercial solvents.

Easy to apply "SCOTCH" Plastic Tapes can be *s-t-r-e-t-c-h-e-d* to conform to odd shaped or irregular surfaces. On at a touch, even in hard to reach places, they are always ready for use and no special application equipment is required. Various colored backings give a bright "finished" look wherever they're applied; different colored bands permit color coding, too.

The complete line of "SCOTCH" Plastic Tapes—in a variety of thicknesses, widths and lengths—is readily available from your nearest "SCOTCH" BRAND Tape Distributor. Call him today, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IAE-110.

When tape costs so little, why take less than "SCOTCH" Brand?

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MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

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For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS

LITERATURE

211—Plastic Sheets, rods, films, tubes, blocks, and flat tubings are listed in 64-page catalog. Includes available sizes, weights, color ranges, textures, grades, and purchasing specifications. *Cadillac Plastic & Chemical Co.*

212—Organic Chlorine Compounds for a variety of uses get detailed coverage in this 44-page booklet. Has physical properties, cleaning formulations, toxicological properties, test data. *Union Carbide Chemicals Co.*

213—Tungsten Carbide Tools, tool tips, dies, and wear parts are described in booklet PL-960 (36 pages) that includes specifications, other details for various quantities of each item. Drawings show exact sizes. *Adamas Carbide Corp.*

214—Ion Exchange Resins, their operating characteristics, physical and chemical properties, test results, and typical reactions, are covered in this 8-page booklet. Demineralizing capacity is shown graphically. *Ionac Chemical Corp.*

215—Metallic Aggregate Concrete booklet (24 pages) has photographs, diagrams, and charts that tell the story of Masterplate concrete floors. Explains installation procedures. *The Master Builders Co.*

216—Industrial Chemicals (94 of them) are reviewed in this newly revised and enlarged, 16-page, quick-reference digest, No. 100-D. There's thumbnail description, physical data, chemical formula for each. *Hooker Chemical Corp.*

217—Ceramic Veneer that can be used with several different backing materials is described in this 4-page color folder. It lists available sizes, finishes, textures, and specifications. *Federal Seaboard Terra Cotta Corp.*

THE
WEAKEST LINK
IN YOUR CHAIN OF
COMMAND IS YOUR
OUTSIDE
SWITCHBOARD
DuKane
strengthens your command with
PRIVATE AUTOMATIC TELEPHONE SYSTEMS
FAMOUS FLEXIFONE INTERCOMS
PAGING AND PUBLIC ADDRESS SYSTEMS
INSPECTION CONTROL SYSTEMS
TIME SIGNALS AND BACKGROUND MUSIC
A good executive can reach any employee, any time, right now . . . not through an outside switchboard, but via modern internal communication systems. With DuKane's famed Flexifone intercom, private automatic telephones, public or pocket paging (and other electronic wonders) the man you want is always there! Your chain of command is strong.
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CORPORATION
DuKane sound and communication systems are installed and serviced by a nation-wide network of over 300 engineering distributors.
Dept. FY110 DuKane Corporation
St. Charles, Illinois
Send me information on DuKane systems for strengthening our internal communications.
Name
Please Print
Company
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City & State

THE MAN IN THE FRAYED FLANNEL SUIT

A young chap came in the other day looking for a job in our marketing department. He had all the necessary talent, education, experience—in short, he was what the people on Madison Avenue call a "bright young man".

But as he reviewed his accomplishments we couldn't help noticing a missing button, the spot on his tie and the haircut forty-eight hours past due.

While he talked about the "corporate images" he had created, we wondered about his lack of sensitivity to his own "corporate image".

When next you consider your company's image-building efforts, perhaps it would be well to include your cleaning program in that thinking. The high productivity of the Work Standards System of cleaning will instill in your employees, customers and visitors the quality image you want.

It will save you money as well.

Industrial Sanitation Counselors

2934 Cleveland Boulevard — Louisville 6, Kentucky
Telephone: TWinbrook 6-0342

226 **For more facts Circle 511 on Reader Service Card**

NEW! LARGER!

Universal METAL HOSE CATALOG!

Ask for Catalog ID-100D

QUALITY . . . *All-Metal* Flexible Hose Products

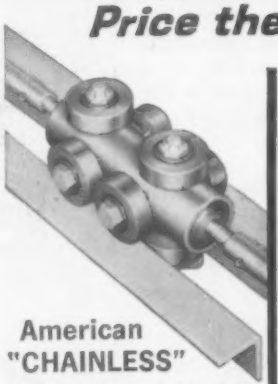
Universal METAL HOSE CO.

2147 So. Kedzie Ave., Chicago 23, Ill.

For more facts Circle 512 on Reader Service Card

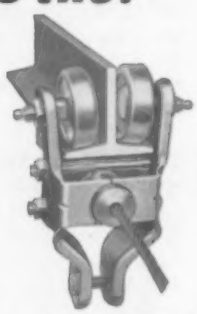
CONVEYORS?

Price these two!



American "CHAINLESS"

NO SPROCKETS! 8-wheeled trolley rolls around curves. Two, three or four-rail track is used on levels, curves or inclines, as needed. Solid steel rods with ball-socket joints connect the trolleys. Caterpillar drive is ideal for in-the-floor tow-type, pallet or overhead installations. Drive indexes precisely. For loads to 400 lbs. per hanger.



American "CABLE-WAY"

COMPACT! Smallest sprocket is only 15¼" diameter. Four trolley capacities: 80, 125, 160 and 250 lbs. per hanger. Trolley side-plates bolt over factory-positioned drive lug. Track bolts together. Conventional sprocket drive. Smooth, quiet, exceptionally low in price. Ask for Catalog CD-B.

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WING

VARI-JET

HEATERS

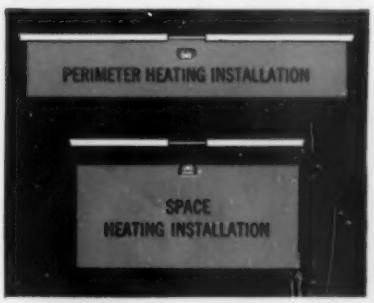
now provide perimeter or space heating too

Wing Door Heaters are needed wherever large doors must be opened during cold weather. They keep all workers in the area of the door comfortable and protected from cold chilling drafts. The high velocity, warm air blanket thrown over the doorway tempers the incoming flow of cold air eliminating worker complaints, absences and loss of production.

Wing Door Heaters, with the new dual purpose door heater or perimeter/space heater discharge is the only one available that gives this full time service. The door switch and room thermostat controls automatically position the discharge damper to suit the heating need.

Thousands of installations throughout industry have proved the effectiveness of the design and usefulness of standard Wing Door Heaters. For more information write today for bulletin DDH-60.

The Wing Door Heater shown is equipped with the new dual purpose Vari-Jet discharge which automatically adjusts the heat flow pattern to blanket the doorway when the door is open and to provide perimeter or room heating—as shown in the drawings below—when the door is closed.



WING

L. J. WING MFG. CO. Division of Aero Supply Mfg. Co. Inc., Linden, New Jersey

FACTORIES: LINDEN, N. J.; MONTREAL, CANADA; IN EUROPE: WANSON, HAEN-NORD, BRUSSELS, BELGIUM

Other Wing products: Revolving and stationary discharge unit heaters. Fresh air supply units. Axial flow fans. Power roof ventilators. Draft inducers. Turbine and motor blowers. WC 155

This Hopper on your truck

CAN CUT HANDLING COSTS 50%

Here's the fastest, lowest cost method of handling bulk materials and small parts—hot or cold, wet or dry.

One man with a Roura Hopper can do the work of two and do it in half the time. Loaded Hopper is picked up by the truck operator in a matter of seconds. Platform or forks slip into underframe and it can't slip off.

DUMPS ITSELF

Loaded Hopper is transported to its destination—operator trips the latch—and the Hopper automatically dumps its load, rights itself, locks itself.

RIGHTS ITSELF

Thousands of Roura Hoppers are now in use handling scrap metal, hot forgings and castings, cinders and aggregate, pickles—and dozens of other items.

LOCKS ITSELF

They're made in eight sizes, ⅓ to 4 yards capacity. Built of 3/16" steel plate with continuous arc-welded seams. Heavier plate if desired, also stainless steel or galvanized. Mounted on live skids or with a choice of wheels. Can ship standard models immediately.

ROURA
Self-Dumping
HOPPER

ASK FOR BOOKLET. Just clip this coupon to your letterhead and mail. We'll send illustrated literature. No obligation.

ROURA IRON WORKS, INC.
1423 Woodland Ave., Detroit 11, Michigan

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

ELECTRICAL

1—Plugs, Jacks, Connectors. Catalog FR-61-E (32 pages) features company's latest products that include shielded and cord-mounted jacks, plugs, adaptors, and push button switches. Photos and drawings of all parts. *GC Electronics Co.*

2—Substation Transformers. Specifications, other data for single- and three-phase oil-immersed transformers are given in 16-pager (5800-1A). Shows such standard features as tanks, core and coil assemblies. *I-T-E Circuit Breaker Co.*

3—Fluorescent Lamp. Here's a 4-pager that tells about new lamp that provides 15% more light than standard 40-watt cool white lamps, 36% more than daylight lamps. How? Colored phosphor combinations. *Westinghouse Electric Corp.*

4—Transformers. Oil- and Pyranol-filled distribution equipment transformers, 112½ to 2500 kva., are featured in this 8-pager (GEA-6832-A). Details on three-legged core construction models and stacker-type units. Photos. *General Electric Co.*

5—Stepless Variable Speed. Operating features, installation suggestions, applications, and general data are contained in Catalog ZM-400C760 (16 pages). Includes dimensional diagrams, torque tables, photos. *The Zero-Max Co.*

6—Magnetic Starters. Bulletin 14-B2 (4 pages) covers motor starters in new sizes 2 and 2¼. Need small mounting area with no reduction in wire room. Plug-in type push buttons or selector switches easily added. *Furnas Electric Co.*

7—Portable Lighting. This 12-page bulletin (B76) shows how lamps, extensions, sockets, and other unitized assemblies can be connected to form economical lighting system. Lists stock components. Selector chart, photos. *Joy Mfg. Co.*

8—Motors. Here's comprehensive 64-pager (A100) with information on a-c fractional and integral hp. single- and polyphase motors, d-c motors and generators, ⅛ to 1000 hp., and other products. *Reliance Electric & Engineering Co.*

9—Relay Tools. "How to Adjust and Maintain Relays" is a small 8-page booklet that also describes tool kit. Detailed instructions, with drawings, will help you correct relay difficulties easily. *P. K. Neuses, Inc.*

10—Electric Heaters. Catalog GEC-1005K (48 pages, revised) lists product and application data for Calrod tubular, finned tubular, cartridge, strip, insertion, and vane heaters, others. Heater control, wiring diagrams. *General Electric Co.*

11—Subminiature Switches. Information on new line of Unimax switches is contained in Catalog No. 20-1 (16 pages). Includes high-temperature, sealed, environment-free, MIL-Specification types. Handy index. *The W. L. Maxson Corp.*

PIPES AND VALVES

12—Hinged Closures. Design features and latest size ranges for piping components are discussed in revised Bulletin TT956 (6 pages). Outlines applications for blanking off pipeline ends, tank or vessel openings. *Chemetron Corp.*

13—Flange Head Fittings. Catalog 4430 (12 pages) tells about new flange head ends and bent tube fittings with 37-degree swivel nuts. Both products use the Hoze-lok socket with "no-skive" feature. Tables of sizes. *Parker-Hannifin Corp.*

14—Plastic Tubing. Bulletin 660 is a 4-pager that lists dimensions, operating data, other details for four types of tubing. These include 3 formulations of vinyl base, polyethylene, two weights of nylon, and air hose. *Textron, Inc.*

Turn the page

GENERAL ELECTRIC

now!

Tri-Clad '55' motors with THERMO-TECTOR* system

WARRANTED

against burnout from overheating

For the *first time* General Electric offers you a motor with such *positive* protection it is WARRANTED in writing against overheating burnout!
G.E.'s exclusive new THERMO-TECTOR system gives Tri-Clad '55' motors truly *inherent* over-temperature protection. Unique variable shut-off feature allows motor to deliver *full power potential* under all operating conditions. Fail-safe THERMO-TECTOR system has simple, two-lead hookup.

*Trade-mark of General Electric Co.

For the first time General Electric offers you a motor with such *positive protection* it is WARRANTED against *overheating burnout*

TURN PAGE FOR FURTHER INFORMATION

NOW - A Motor *Warranted in Writing* Against Overload Burnout!

General Electric Company warrants to the Purchaser that the Tri-Clad '55' motor with Thermo-Tector system delivered hereunder will:

(a) Not burn out because of overheating resulting from overload, lack of ventilation, single-phasing, stall, high ambient, or voltage unbalance, as long as the Thermo-Tector switches are connected into the control circuit so that power to the motor is removed when an over-temperature condition occurs;

(b) Be free from defects in material, workmanship and title; and

(c) Be of the kind and quality designated or described in the contract.

The foregoing warranty is exclusive and in lieu of all other warranties whether written, oral, or implied (including any warranty of merchantability or fitness for purpose). If it appears within one year from the date of shipment by General Electric Company that the equipment delivered hereunder does not meet the warranties specified above and the Purchaser notifies the General Electric Company promptly, the General Electric Company shall thereupon correct any defect, including non-conformance with the specifications, at its option, either by repairing any defective part or parts or by making available at the General Electric Company's plant, a repaired or replacement part.

The liability of the General Electric Company to the Purchaser (except as to title) arising out of the supplying of the said equipment, or its use, whether on warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided and upon the expiration of said one year, all such liability shall terminate. The foregoing shall constitute the sole remedy of the Purchaser and the sole liability of the General Electric Company.

General Electric's *exclusive* THERMO-TECTOR system is available now on *all* Tri-Clad® '55' motors in frames 254U-445U. Contact your General Electric Apparatus Sales Office or Authorized Distributor *today* for details on this NEW FULLY WARRANTED MOTOR PROTECTION SYSTEM. Or, write for Bulletin GEA-7092, Section 866-04, Schenectady 5, N. Y.

SMALL AC MOTOR & GENERATOR DEPARTMENT

GENERAL ELECTRIC

For more about these items, circle numbers on Reader Service Card next to back cover.

15—Couplings. Here's a 16-pager (No. 1475) that describes new double shut-off quick coupling. Called Series G, coupling has two-way check valve to stop flow from both lines when making or breaking connection. *Perfecting Service Co.*

16—Tubing. Bulletin No. 71 (16 pages) is new edition of selection guide now available on small diameter super alloy tubing. Comprehensive table includes chemical composition of eight alloys, and other data. *Superior Tube Co.*

17—Plastic Hose. Facts about flexible plastic vacuum and vent hose are contained in illustrated 8-pager. Gives diameters, lengths, construction details, and applications for hose ranging from ¼-in. to 4⅛-in. diameters. *Dayco Corp.*

MATERIAL HANDLING

18—Small Parts Conveyor. This 8-pager (Form 800) explains construction features of cleated belt conveyors for general, light, and heavy duty. Photos show products and their applications. Dimensions, speeds. *The Rapids-Standard Co.*

19—Shipping, Handling Systems. Bulletin No. 716 is a 16-pager that describes how engineered protection against shipping/handling damage can be achieved with elastomeric mountings. Illustrates examples of systems. *Lord Mfg. Co.*

20—Hydraulic Cranes. How these multi-purpose mobile cranes can simplify many handling problems is explained in Bulletin 3000 (8 pages). On-the-job pictures show general and special applications. Lists accessories. *Ruger Equipment, Inc.*

21—Winches, Hoists. Here's a file of 10 data sheets that cover rescue hoists, boom drives, heavy-duty cargo hoists, combination winches and hoists, hooks, accessories. Construction and application details, photos. *Breeze Corps., Inc.*

22—Conveyors. Catalog GC-1 (44 pages, revised) is a comprehensive handbook with new ideas for materials handling. Explains principles of coordinated system; photos, diagrams show techniques, applications. *The Rapids-Standard Co., Inc.*

23—Belt, Gravity Conveyors. Two catalogs (4-pagers): No. EB460 describes Series E units with components interchangeable between horizontal and inclined conveyors. No. GC859 covers gravity wheel, roller units. *Conveyor Specialty Co.*

24—Live Storage System. Conventional warehousing methods are compared with live storage system known as Quik-Pik in 12-page manual. Tells how system can be custom-assembled to suit any size, shape. *North American Equipment Corp.*

25—Portable Racks. Two catalogs: One describes how you can have more storage space in your warehouse by using portable pallet stacking frames. Another (4 pages) shows how to protect the life of your pallet with pallet guard. *Tier-Rack Corp.*

26—Electric Truck Batteries. This 8-pager (GB1944) has new battery selection chart with dimensions, ampere-hour capacities, weights, other data for 16 battery types. Ratings from 12 to 36 volts. *Gould-National Batteries, Inc.*

BUILDING

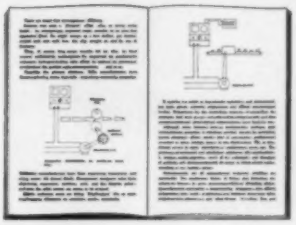
27—Hinges. Here's a handy ready-reference catalog (No. 153, 56 pages) that includes just about every kind of hinge you'd ever need. Information covers butt, loose joint, stop, spring, many others. Well indexed. *Braun Mfg. Co., Inc.*

28—Grating, Stair Treads. Characteristics of new steel grating and treads are discussed in Bulletin 1112 (12 pages). Includes design, applications, panel widths and load tables, with details of standard and close spacing. *Dravo Corp.*

Turn the page

MAKE
YOUR PRESENT EQUIPMENT PRODUCE MORE!

. . . This free book tells you how!



Now you can boost output of your present equipment — safely, easily, and inexpensively. With load controls, you can speed up tooling, feeding, and grinding operations without risk of exceeding specified limits. You can establish end-points for stamping, crushing, polishing, and mixing operations. You'll increase machine load and production flow, assured that equipment is automatically protected against damage or wear.

Easily-installed Mek standard load controls keep your equipment operating economically at maximum safe loads — yet react instantly at the slightest hint of overload to protect machinery, tools, dies, and material.

Responding to telltale deviations in motor input current, Mek load controls automatically trigger any desired reaction: *stop, reverse, trip, signal, recycle, or index.* You can automatically regulate material feed rates, tool-to-work force, conveyor operation — easily automate hundreds of mechanical functions now dependent on human alertness.

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MEK
Machinery Electrification, Inc.
60 Hudson St., Northboro, Mass.

Circle 516 on Reader Service Card

GO-GETTER CUTS COSTS IN HALF; MAKES JOB SAFER

A leading chemical plant faced with the double explosion hazard of ethylbenzene fumes and aluminum chloride dust, solved its material handling problems – and saved money in the process – through the use of Revolvator's new fork lift trucks labeled Type Ex by Underwriters' Laboratories for Class 1 Group D explosion hazardous areas.

Previously, two men with a hand truck were required for this operation. Since the introduction of the Explosion Proof Go-Getter, one operator easily charges the hoppers in a safe manner with a minimum effort. "What used to be a dangerous, disagreeable job has now become a simple task," says the plant manager.

The explosion proof Go-Getter, available in 12 standard models, is but the latest development in Revolvator's better than a half century of experience in materials handling equipment covering standard walkie lift trucks, hand lift trucks, portable elevators and related equipment.

REVOLVATOR CO.

8761 TONNELE AVENUE, NORTH BERGEN, N. J.

SINCE 1904

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

AUXILIARY

29—Heating, Ventilating Units. Bulletin No. 404 (16 pages) describes air conditioning, heating, and ventilating central station units, from 400 to 30,000 cfm. All sizing data on graphs. Other technical data, diagrams. *Airtherm Mfg. Co.*

30—Blowers, Pumps. How horizontal and vertical blowers and gas pumps automatically provide a metered quantity of oil-free air at constant volume is explained in 12-pager (S59-H). Charts, drawings of dimensions, etc. *Sutorbilt Corp.*

31—Water-Cooled Condensers. This 8-page booklet (WC-300) discusses five types of mechanically cleanable condensers for refrigeration and air conditioning. Includes sizes that range from ⅓ to 25 tons. *Halstead & Mitchell Co.*

32—Steam Converters. Specifications, selection and operation data on converters for heating radiation water with steam are given in Catalog 1460 (20 pages). Piping installation diagram, pressure drop curve. *Dunham-Bush, Inc.*

33—Water Heaters. Here's an 8-pager that illustrates and describes eight models of injection water heaters for use with high or low pressure steam. Capacities from 500 to 50,000 gph. Low initial and operating costs. *Pick Mfg. Co.*

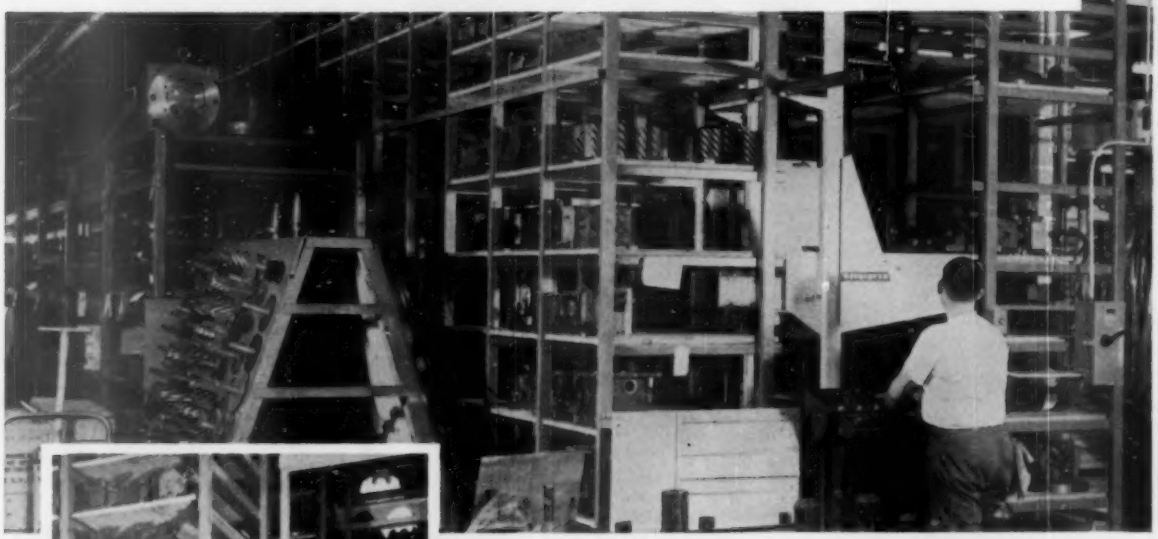
34—Warm Air Heater. Bulletin 43-11 (8 pages) tells the Thermobloc story with details about the economy of direct heat transfer. Shows how the unit is constructed. Lists six models, with dimensions, diagrams, photos. *Wanson Corp.*

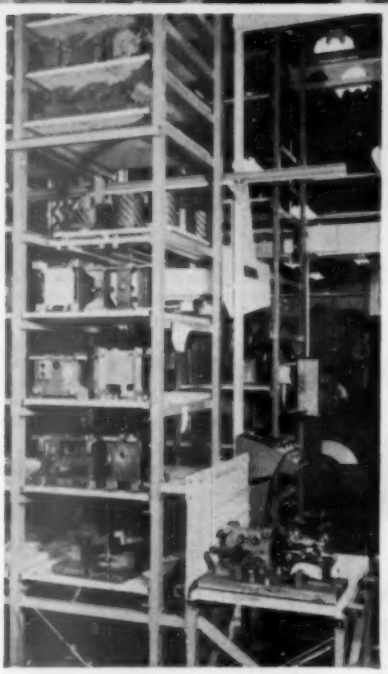
35—Terminal Control Units. Catalog No. 1060 (36 pages) describes new line of acoustic terminal control units for all-air high-velocity systems. Includes specifications, other data on three ceiling and two window models. *Carnes Corp.*

Turn the page

BURSTING AT THE SEAMS!

INSTALL AN R-46 FINGERTIP CONTROL TOOL CRIB





SAVE 70% ON SPACE . . . 30% ON LABOR!

In this new R-46 *Retriever*® installation at the New Philadelphia, Ohio, plant of the Warner and Swasey Co., many factors were of prime consideration.

A need for storage of dies, fixtures and special tools . . . making maximum use of a limited amount of space and offering quick, easy access to the items stored . . . presented pressing problems.

As installed, the TRIAX® R-46 *Retriever* provides 768 openings of 1000-lb. maximum capacity with a load base dimension of 24" x 36" . . . twice as much storage volume as was available with the equipment previously used. 3,270 square feet of floor space was released for other use. Tooling time and return to storage time were significantly reduced.

In this case, the *Retriever* helped solve a serious space shortage and tool die and fixture storage problem. It is also being used for work-in-process, electric motors storage, and other material handling applications.

We would welcome the opportunity to discuss the possible advantages of an R-46 *Retriever* installation in your factory or warehouse.

This simple, push-key console controls the unique two-way *Retriever*®. The keys on the left set the *Retriever* to deliver an incoming load into the desired opening. Setting the right-hand panel will direct the *Retriever* to bring back any other load on the return trip.

THE TRIAX COMPANY

SWeetbriar 1-9800

11955 SHAKER BLVD. CLEVELAND 20, OHIO

For more facts Circle 518 on Reader Service Card

Is clean, dry, oil free air

designed into your

Compressed air system?

Only with Adams Aftercoolers and Cyclone Separators can you get virtually **complete** removal of pipeline oil and water vapor — for these reasons:

1. MORE COMPLETE CONDENSATION. Adams Aftercoolers reduce air or gas temperature to within 10° of cooling water. With their efficient counter-flow design, the air passing through the tubes is cooled by 13-pass cooling water over the tube bundle. This cooling achieves maximum condensation of oil and water vapor.

2. MORE COMPLETE SEPARATION OF OIL LADEN CONDENSATE. Adams Cyclone Separators have a unique conical design which produces efficient, 2-stage separation; first, heavier particles in the upper portion; then the finest particles are removed in the inner vortex formed within the conical area. This offers a constant high separation factor over a wide range of volumes—a characteristic not possible with baffle and other type separators.

You pay no more for superior Adams performance because of Adams specialization in these units for over 25 years. They have engineered the extra features into mass-production techniques which keep unit costs down.

New Bulletin 714 merits your attention for fullest possible protection to your air-actuated equipment. Write for your copy today.

R. P. ADAMS CO., INC. • 219 East Park Drive, Buffalo 17, N. Y.
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SAFETY FIRST
DON'T TALK TO MACHINE OPERATOR
DANGER
HIGH VOLTAGE
THINK
KEEP THIS PASSAGEWAY CLEAR
SET YOUR CLOCK TO SAFETY!
BE CAREFUL
KEEP THIS PLACE CLEAN AND ORDERLY
Have 'round the clock protection with READY-MADE Safety Signs! Thousands of proven safety wordings to warn workers.
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FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

PRODUCTION

36—Rotary Assembly Machine. "A New Approach to Automatic Assembly" is a 12-pager (No. 602) that explains machine tool concept to reduce equipment investment. Diagrams of space-saving integral stations. *Ferguson Machine Corp.*

37—Threading Tools. Here's a comprehensive 44-page bulletin (DT60) that describes and illustrates Vers-O-Tool self-opening threading and hollow milling heads, collapsible and solid adjustable taps. Lists parts. *National Acme Co.*

38—Regulators, Manifolds. Specifications, other information covering regulators for use with all industrial gases and portable manifolds are contained in 16-pager (F55-085-A). Gives details on single-stage gageless regulators. *Linde Co.*

39—Welding Hardenable Steel. Bulletin SP6A (8 pages) discusses spot welding techniques and equipment suitable for various steels. Lists low alloy high tensile steels adaptable to spot-welding method. *The Taylor Winfield Corp.*

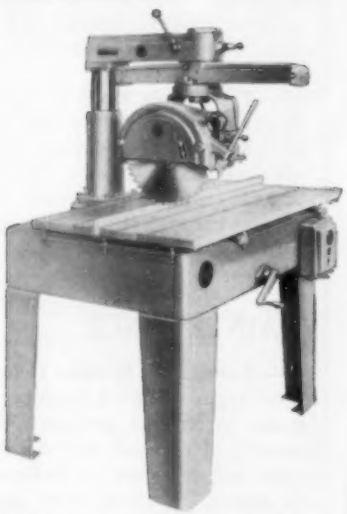
40—Tools. Light-heavyweight machine tools, accessories, and components are described in 52-page illustrated catalog (WT50, Rev. 3). Discusses power feed drill presses and other new tools for production-line application. *Rockwell Mfg. Co.*

41—Welding Equipment. This 27-pager titled "A Pictorial Report of Developments in Highly Precise, Fully Automatic Fusion Welding Equipment" is just that. It gives applications, descriptions of equipment and controls. *Sciaky Bros., Inc.*

42—Milling Cutters. Nearly 500 throwaway insert milling cutter styles and sizes are listed in this illustrated Catalog V.M.U.60-A (24 pages). Covers cutter bodies, cartridges, inserts and accessories for milling steel, etc. *Valeron Corp.*

Turn the page

Every miter cut is perfect



14"-16" Radial Saw, also 16"-20", 10" Portable and 9" models.

You get precision that pays off in profits when you buy a Delta Radial Saw, thanks to "micro-set" miter stops—a feature only Delta offers. These positive stops are individually adjustable—give you perfect 90° and 45° right and left hand miter cuts *for the life of the machine!*

You can do more work faster—on anything from heavy production cutting to light finishing jobs—because Delta Radials give you all the power you pay for plus quality features only 31 years of experience can build into a machine.

Visit your Delta Distributor—take a long, hard look at the rugged, versatile Delta Radials, then see the entire line of Delta woodworking tools and accessories he carries. He's listed under "TOOLS" in the Yellow Pages. For FREE Delta Industrial Catalog write: Rockwell Manufacturing Co., Delta Power Tool Division, 628L N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL

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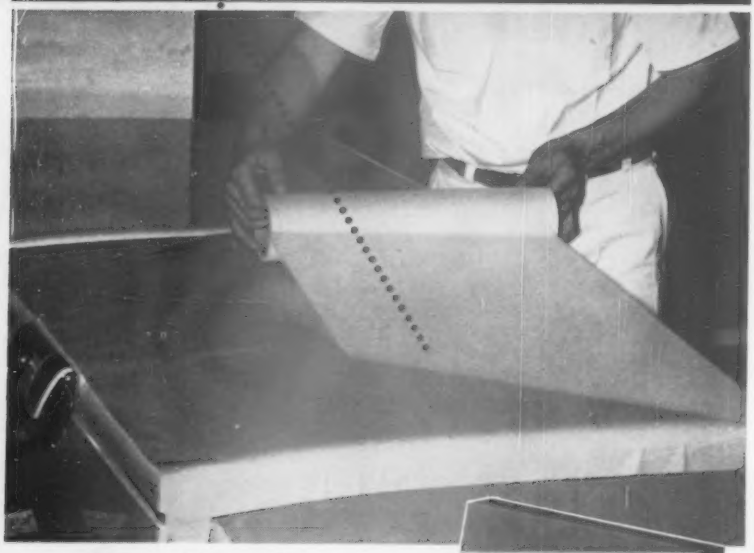
PROTECTS SURFACES
without
STAINING or DEPOSIT



Shuford's
SHURTAPE®
FP-53
PROTECTIVE TAPE

Use SHURTAPE FP-53 to preserve finished and highly polished surfaces during fabrication, storage and shipment. It's the protective tape that strips clean without staining!

This polymer impregnated flat-back paper tape adheres instantly to surfaces of

- Stainless Steel • Aluminum (anodized or allodized)
- Glass • Hard Rubber • Enameled or lacquered Steel
- Many plated surfaces
- Polyester • Polystyrene • Plexiglass
- Other plastics

Shuford's SHURTAPE FP-53 is highly resistant to water, solvents, oil and abrasion . . . use it to protect against marring, without staining the surface.

Write for free sample roll of SHURTAPE FP-53 and complete information to

CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

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HICKORY, N. C.

World's largest manufacturer of cotton cordage

4502

236 For more facts Circle 522 on Reader Service Card

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

43—Scale Models. Here's an 8-pager that discusses advantages of three-dimensional scale models that help you "see" an entire plant at once. Useful for employee training. *Knight Models, Inc.*

44—Turret Lathe. Catalog 1179-B (24 pages) tells about an automatic chucking turret lathe that uses a new principle for pre-selecting feeds and machine functions. Capacities, speeds and feeds have been increased. *Gisholt Machine Co.*

45—Socket Cap Screws. Facts you should know about maker's "1960 Series" socket head cap screws are discussed in 6-page catalog. Dimensional and comparison data on both the 1936 and 1960 series. Lists other features. *Standard Screw Co.*

46—Gear Finishers. Bulletin 870-60 (8 pages) describes and pictures special features. Covers three methods of shaving that can be used: underpass, transverse, and modified underpass. Shows simplified set-up procedures. *Michigan Tool Co.*

47—Dies for Extruded Shapes. Two catalogs: One, a 40-pager, lists 700 stock dies for aluminum extruded shapes, rods, and bars. Dimension diagrams. Another (a 16 pager) covers company's services and facilities. *General Extrusions Inc.*

48—Tips, Tools, Holders. Specifications and general information on all of company's metal cutting products are contained in Catalog TTI-60 (44 pages). Includes description of new general-purpose steel cutting grade. *Firth Sterling Inc.*

MAINTENANCE

49—Lubricating System. Details on three types of new Circulube automatic system to provide positive control of oil feed and circulation rates are described in Bulletin CL (4 pages). Drawings show applications. *Bijur Lubricating Corp.*

Turn the page

To get costs down and output up convert to straightline process methods with . . .

LINK-BELT trolley conveyors

BALL BEARING TROLLEYS

Made in Link-Belt's bearing plant by bearing specialists! Handle extreme loads. Hardened, concentrically ground raceways, frictionless labyrinth seals. Available in 2- or 4-wheel load bar types, riveted or bolted wheel assemblies.

I-BEAM TRACK

Special 3-, 4- and 6-in. high-carbon steel I-beam track is stocked. All three sizes are offered in 20-ft. lengths, painted or unpainted, with ends saw cut and squared. Standard and special vertical and horizontal curves also available.

CHAIN

Link-Belt drop forged steel Rivetless Chains are stocked. Flexible in two planes. Heat treating of entire chain provides exceptional strength and wear resistance. Assembly and disassembly can be done easily without tools.

HOOKS AND CARRIERS

Products of practically any size, shape and weight can be handled by Link-Belt's variety of hooks, racks, trays, slings, buckets, etc. We will design special carriers for your particular needs.

DRIVES

Caterpillar and corner sprocket types. All use new Link-Belt helical-worm gear speed reducers with an extended dry well type bearing housing on the output shaft. This provides built-in shaft alignment and maximum capacity for overhung loads.

TURNS AND TAKEUPS

Link-Belt stocks roller and traction wheel turns and takeups in a full range of sizes. Turns guide conveyor chain around horizontal turns . . . takeups control chain slack, permit removal of excess chain when necessary.

LINK-BELT makes all mechanical components . . . all available from stock

Whether you need a mile-long, custom-tailored system or a single component, Link-Belt can fill your trolley conveyor order . . . fast! Link-Belt makes *all* mechanical components (drives included) . . . and is one of industry's most experienced designers of trolley conveyor systems. Past installations involving products and plants of every description enable Link-Belt to apply a unique kind of "practical ingenuity" to the challenges of your physical layout and production demands.

For complete information, contact your nearest Link-Belt office. Or write for Trolley Conveyor Book 2330.

LINK-BELT

TROLLEY CONVEYORS

15.272

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses and District Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

3 POWELL EXCLUSIVES REDUCE PRODUCTION HANDLING COSTS, SAVE SPACE, SPEED OPERATIONS

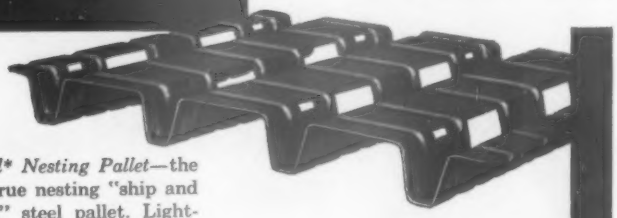
Flow-Matic Production Systems* can reduce work station handling by 50%. Fastest, most efficient handling method available. *Write for Bulletin FM.*

Typical of Powell's leadership in modern materials handling equipment are the three exclusive designs—

1. Nesteel* Nesting Pallets
2. Integral Knee-Brace* Platform Construction
3. Flow-Matic* Production Systems

Each provides a unique advantage that adds up to better, faster, safer, less costly handling for your plant.

Powell's line ranges from standard pallets and platforms to complete materials handling systems . . . all described in *free bulletin 900.* Write for it today.



Nesteel Nesting Pallet*—the only true nesting "ship and return" steel pallet. Lightweight—strong—may have four-way entry—ideal for confined or angle storage areas. *Write for Bulletin X100.*

*Integral Knee-Brace** construction eliminates conventional platform weakness—adds years of service at no extra cost. *Write for Bulletin 2449.*

POWELL PRESSED STEEL

THE POWELL PRESSED STEEL COMPANY
50 ERIE STREET • HUBBARD, OHIO
The most complete line of material handling equipment.

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

50—Work Gloves. Here's Selector Guide and case history facts that cover basic styles, other specifications of work gloves. Tips on grades of leather, physical properties of plastic coatings, other materials. *Riegel Textile Corp.*

51—Audible Signal Equipment. Specifications and general information on signal devices and types suitable for specific noise level areas are contained in Bulletin K (16 pages). Mounting methods, decibel output charts, detailed construction processes. *Thomas Industries.*

INSTRUMENTS AND CONTROLS

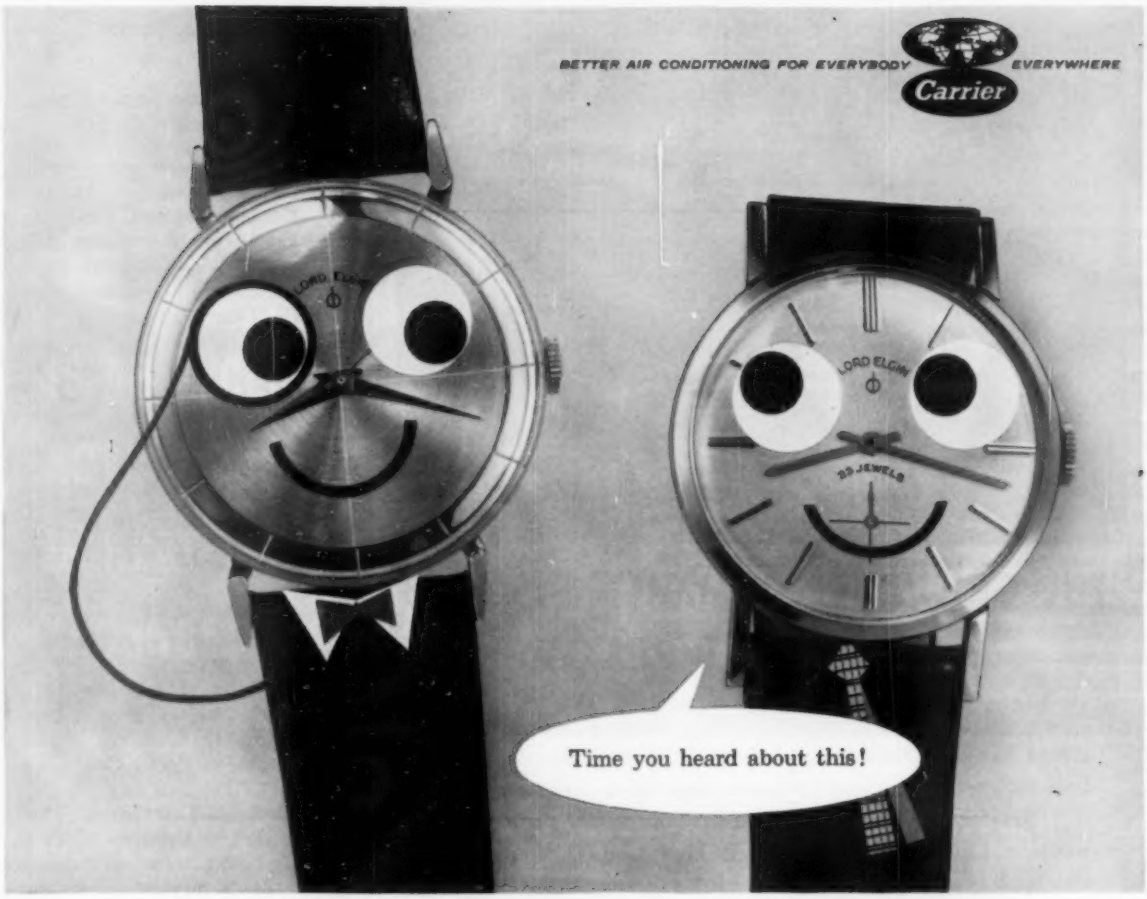
52—Leak Detector. Bulletin GEA-6827A (10 pages) discusses Type H-6 halogen leak detector and accessory equipment for air conditioning and refrigerant service. Has information on three low-cost leak detectors. *General Electric Co.*

53—Alarm Rotameters. Two types of rugged magnetic and electronic instruments for measuring fluid rates of flow and warning of abnormal flow rates are described in 4-pager (18A). Construction, application, operating data, tables of sizes, etc. *Schutte and Koerting Co.*

54—Numerical Control System. Advantages of new system that includes production accuracy of ± 0.0002 on a 40-in. work table are given in 8-pager. System provides control commands for milling machine, jig borer, etc. *Diehl Mfg. Co.*

55—Flow Meters. Catalog C295-1 (8 pages), Data Sheet 10.3-9 (4 pages) discuss Whirl-Flo meter that uses vortex-velocity principle for measuring liquids and gases. Meter can be used with other instruments. Lists models, tables, charts, diagrams. *Minneapolis-Honeywell Regulator Co.*

Turn the page



ELGIN EARNS 68% ANNUAL RETURN ON CARRIER AIR CONDITIONING INVESTMENT

When the 96-year-old Elgin National Watch Company of Elgin, Illinois talks about factory air conditioning, it speaks from long experience. For Elgin is not only the oldest American manufacturer of jeweled watches, but also one of the early industrial users of air conditioning.

When its Carrier system was installed back in 1936, the company had only one object in mind: to provide the controlled atmospheric conditions necessary for the exacting work of producing smaller, more accurate watches. But management quickly discovered an unexpected bonus.

The efficiency of Elgin workers rose during summer months. And this was reflected in substantially lower costs, as is always the case when labor represents a large share of the cost of a product. So more and more Carrier equipment was added over the years.

Today Elgin management credits its air conditioning with a 4% increase in annual productivity or almost three times the 1.5% normally required to cover owning and operating expense. Annual return on investment is 68% in terms of worker efficiency alone.

Manufacturers in all sections of the country—making a wide variety of products—report similar high returns on an investment in Carrier year-round air conditioning.

Will factory air conditioning pay off for you? The coupon below will bring you a booklet that describes four important yardsticks. Write for it today without obligation. You are sure to find it helpful. Carrier Air Conditioning Company, Syracuse, New York.

To Carrier Air Conditioning Company, Syracuse, N.Y. I am interested in receiving your booklet, "Will factory air conditioning pay off for me?"

Name_____

Company_____

Address_____

City_____ State_____

"THE GRIEVANCE COMMITTEE IS HERE ...ABOUT THAT DUST AGAIN!"

"This was the third time in a month that the grievance committee had complained about the dust in the shop. And this time they wanted to know what I intended to do about it.

"Frankly, I was on the spot. Oh, not that I blamed the workers. I knew the shop was dirty. How could it be anything else with grinding machines running 16 hours a day? And I was as unhappy about the situation as the employees were. Poor employee morale was serious enough—and absenteeism, machine wear, misalignment and down time caused by dust was costing plenty.

"Then I remembered a salesman with a dust collecting machine system had called on me a few months back. I dug his card out of the file and found he was from the Torit Company. I got him in pronto—and I bought one of his Model 90 Cabinet machines for less than $1,000. It services four surface grinders and it really performs. A month later I had Torit Dust Collectors installed for the rest of the machines.

"Torit Dust Collectors have practically eliminated the dust in our shop. And you can imagine the effect this has had on employee morale. People are happier and healthier. Absenteeism is no longer a problem and our production rate is higher than ever."

Cabinet Model 90

Torit can solve your dust problems. For complete facts on dust . . . and how to control it . . . write

TORIT manufacturing company

1133 Rankin St., St. Paul 16, Minn., Dept. 331

FACTORY / CATALOG NEWS

Begins on page 228

For more about these items, circle item numbers on Reader Service Card next to back cover.

56—Gauges, Controls. This 6-pager (2030) tells about pressure gauges, four types of thermometers, indicating controllers, recorders, accessories. Dimensions, construction features, accuracies, uses. *American Machine & Metals, Inc.*

57—Safety Enclosures. Here's a 32-pager (AIA. No. 35E) that describes glove, vacuum, and dry boxes, controlled atmosphere systems for research and production purposes. Specifications, other data. *Kewaunee Scientific Equipment.*

58—Pneumatic Computer. Design, operation features of computing relay is discussed in Catalog 53C1000 (8 pages). Lists details for each of computer's operations that include multiplication, division, squaring, etc. *Fischer & Porter Co.*

59—Electrical Calculators. This 8-pager (SP-8A) contains tables that simplify calculation of electrical power supply required by resistance welders. Tells how safe rate of operation can be determined. *The Taylor Winfield Corp.*

MECHANICAL

60—Back-Up Rings. Catalog 5482 (8 pages) discusses characteristics and advantages of contoured and continuous back-up rings. Diagrams show applications, extrusion of various materials. Tables give sizes, dimensions. *Parker Seal Co.*

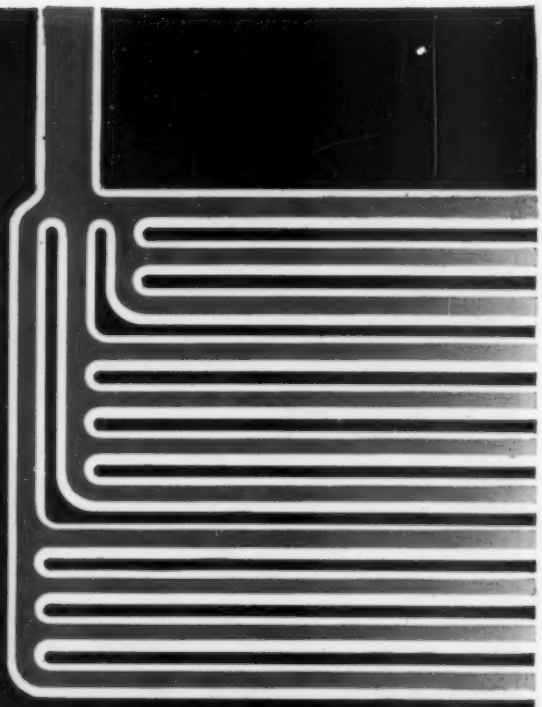
61—Speed Reducers. This 12-pager (F-2003) describes Shaftmount Syncrogear. Includes high- and low-gear ratios for each hp. and frame size, optional operating positions, dimension tables, drawings. *U. S. Electrical Motors Inc.*

62—Oscillating Motors. Here's an 8-pager (Form 601) that covers high-efficiency pneumatic or hydraulic motors with instant full torque. Diagrams show single and double vane models. Tables give sizes, dimensions. *Roto-Tork Mfg. Co.*

NEW MULTI-ZONE

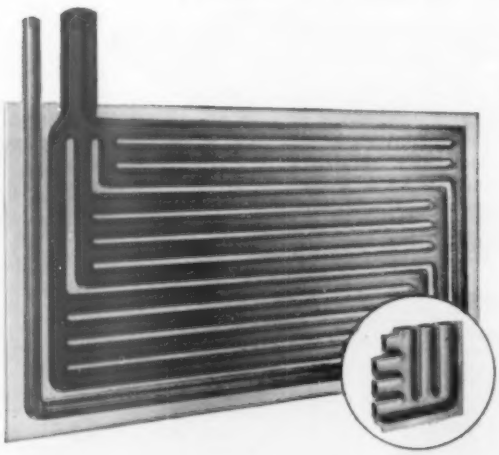
PLATECOIL®

IS AN EXCLUSIVE TRANTER ADVANCEMENT IN HEAT TRANSFER TECHNOLOGY



The new MULTI-ZONE PLATECOIL introduces a new principle of coil design. The multiple header, multiple return pass arrangement produces FREE-FLO action. Steam is distributed to all levels of the coil almost instantaneously. This new design overcomes the problem of condensate "trapping" — a disadvantage of common pipe coils and single-headered units—that robs effective heat transfer area. Only TRANTER PLATECOIL offers the extra capacity of MULTI-ZONE heat distribution.

MULTI-ZONE PERFORMANCE SOLVES TOUGH TANK AND PROCESS HEATING PROBLEMS



Better steam distribution provides a reserve capacity for heat transfer to overcome overload conditions which drop tank and process vessel temperatures. Heat-up time after tank or processing equipment shut-down is cut to a minimum. Tank temperatures are maintained within closer limits and production is improved.

More effective heat transfer area and more heat transfer per square foot of area makes it possible to use fewer and more compact PLATECOIL units than is possible with other types of equipment. Valuable tank space is saved and the need for addition of new tanks to get higher production is often eliminated.

Add to these performance advantages, low cost of installation and operation, economical maintenance and scientific engineering for the best answer to your heat transfer problems.

Write for NEW Bulletin P60 for complete data.

Tranter Manufacturing, Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

For more facts Circle 527 on Reader Service Card

Works near people with no distracting noise or fumes

AUTOMATIC DOCKER

Here's the industrial truck that's ideal for materials handling near production line assemblers, machine tool operators and other indoor workers. The battery-powered electric Docker works silently and smoothly without engine noise or objectionable fumes that disturb workers and cause operator fatigue. Because of its stand-up end control design it can work easily in any type of congested areas where the operator is required to be constantly on and off the truck.

The Docker is just one of over 200 AUTOMATIC models which offer the advantages of battery powered electric truck operation. Get the full story about the Docker in the brochure "Docker Facts and Factors" or write for the helpful Truck Selector Guide which describes the complete AUTOMATIC line. Write today.

Tight quarters on docks and inside trucks are no problem for the Docker with its short overall length and zero inside turning radius. Capacities 1500 to 4000 lbs.

AUTOMATIC®

AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale and Towne Manufacturing Company
39 W. 87th Street, Dept. WO, Chicago 20, Ill.

NEW From the oldest name in weighing...

COUNTER SCALES

with space-age styling!

Slimmer! Trimmer! Styled to save space—match your facilities. AND unfailing accuracy to match your increased need for precise weight measurement.

Pounds lighter, smartly streamlined, these new models provide an accessibility that makes readings easier—a matter of a few seconds. Combining F-M accuracy with smart, compact design, these scales are truly the most modern in the industry!

FOR EVERY COUNTER SCALE USE—

These versatile utility scales come in 14″ x 18″ and 11″ x 14″ platform sizes. They have various capacities, (as high as 350 lbs.), and provide for weighing within accuracies of 1/100 lb.

For further information, see your nearby Fairbanks-Morse expert. Or write to: Fairbanks, Morse & Co.; Scale Division; Fair Lawn, New Jersey. Ask to see these F-M models today.

Fairbanks, Morse

SCALE DIVISION

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

The New F-M Union Scale

New F-M Suspended Platform Counter Scale With Double Beam

Union Scales
Suspended Platform Counter Scales With Single Beam
Suspended Platform Counter Scales With Double Beam (with or without scoop)
Suspended Platform Package Scales With Full Capacity Beam (tall pillar)
Suspended Platform Package Scales With Full Capacity Beam (short pillar)

For more facts Circle 529 on Reader Service Card

WHEN THIS UNIT IS
DOWN

YOUR COSTS GO
UP

Beat the Problem by
LEASING your
Materials Handling
Equipment from
RYDER

If you're tired of taking a beating on costly "down-time" take a look at the Ryder lease, a real knockout of a solution.

Your capital is released for other needs. All you do is budget one economical monthly lease rate* . . . let Ryder do all the WORRYING about "down-time," obsolescence, and costly repair bills.

It won't cost you anything and it could save you some big money by writing today for the "Full Story" folder from...

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P.O. Box 33-816, Dept. E23, Miami, Florida

DIVISION OF RYDER SYSTEM

*This rate can cover a complete Ryder leasing package including truck and car rental, if you wish.

244 Circle 530 on Reader Service Card

FACTORY BOOKS

Guides to modernized management

Two effective new management books—one by an operating executive, the other by a consultant—offer practical guidance to men faced with the need for overhauling established practices. Both books are well written, penetrating, and clearly the work of men who know what they're writing about. Both books are generously studded with examples taken from actual experience. Best of all, both are easy to use. These are guidebooks, not lectures by men who've never caught hell from the front office.

Management Practices begins with a statement of management policy calling for a sense of direction, a sense of responsibility, and recognition of the fact that sound, democratic management means neither paternalism nor anarchy. Author Anderson singles out five basic elements of management: planning, organizing, staffing, executing, and appraising. The general problems that arise in each area, and the ways in which they can be resolved or headed off, are treated fully and concisely. Each has invaluable checklists for evaluating performances.

The author makes a strong case for discarding typical line and staff distinctions present in many organizations. He details the responsibilities of each management function, and tips and checklists assist the reader in getting immediate benefit.

Management by System is a revised and expanded edition of *Streamlining Business Procedures*, which appeared in 1950. In addition to extensive revisions of the previous material, the book contains three new chapters covering integrated management reports, computer feasibility studies, and an approach to integrated data processing.

More for top managers than for systems and procedures specialists, the book discusses systems from the standpoint of coordinating and controlling a complex organization. *Tested* techniques for designing and installing workable procedures are covered in detail, as are thoughts on making the system pay off, overcoming resistance, and developing better teamwork and efficiency. Systems specialists will find a motherlode of practical information on fact-gathering, analysis and interpretation, culling out wasteful practices, and "selling" recommendations.

The book has a valuable treatment of the ways in which systems go haywire—and how to avoid these pitfalls. It points out how sound systems can be used to improve customer relations, morale, production and distribution control, and overall communications and operating efficiency. (Reviewed by Roger W. Christian.)

Management Practices, by Richard C. Anderson. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 302 pages. $7.

Management by System, by Richard F. Neuschel. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. 360 pages. $7.95.

A corrosion classic

It's all too seldom that men concerned with the management of technical industries can find a reference book that offers both complete, accurate engineering information and a highly-readable, easy-to-use format. But *The Corrosion and Oxidation of Metals* is just such a book. Author Ulick R. Evans of Cambridge University treats his vast subject with typical British thoroughness. And he has the ability to minimize the complexities of a difficult subject.

It is multi-level reading that can be profitably studied by anyone interested in corrosion, whether he's a research physicist or a sales manager. To aid readers who want to explore the more technical sections of the book but who haven't a still-warm engineering degree, there are appendixes that briefly (but effectively) cover the necessary principles of physics, chemistry, and electro-

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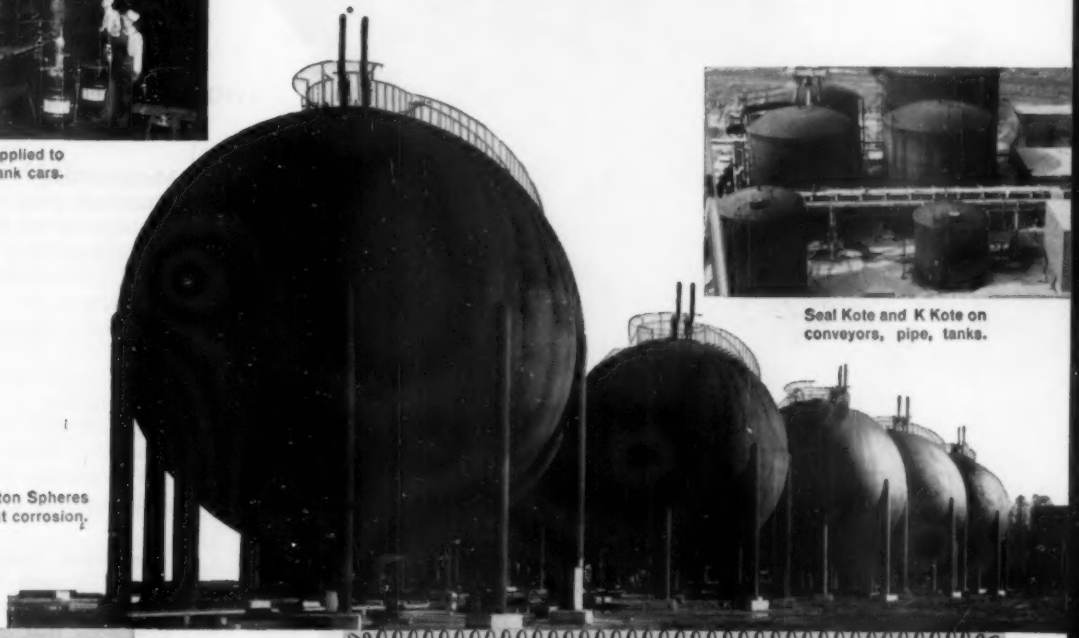
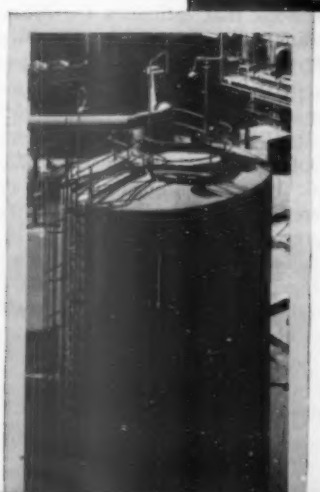


Seal Kote on Horton Spheres to prevent corrosion.



K Kote on soap and black liquor tanks at pulp mill.

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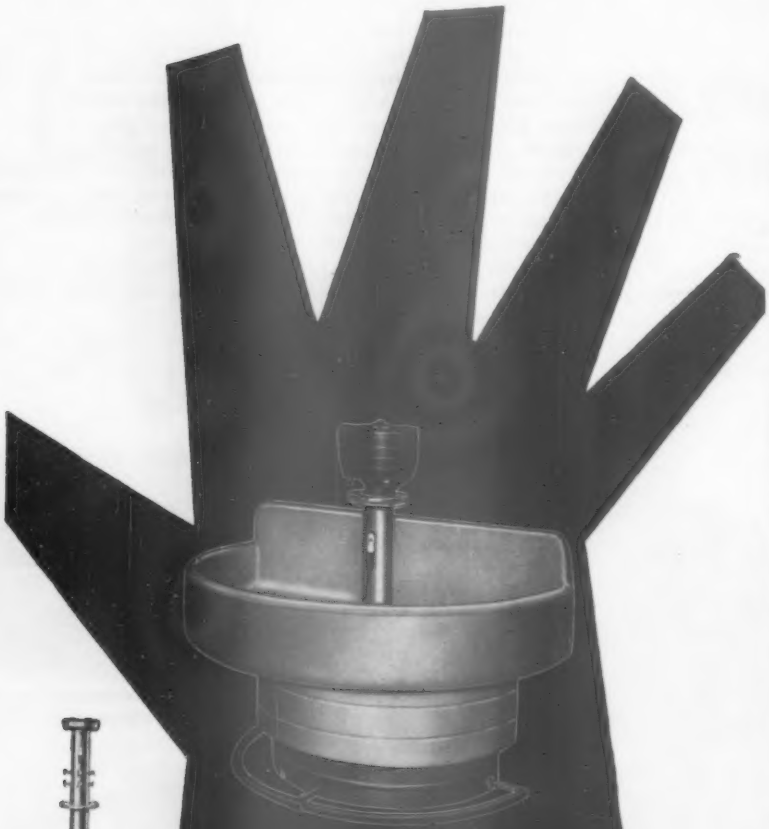

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chemistry. There's also a complete set of references to both American and European works on the subject. (Reviewed by Richard L. Grant.)

The Oxidation and Corrosion of Metals, by Ulick R. Evans. St. Martin's Press, 175 Fifth Ave., New York 10. 1094 pages. $25.

Electrical Efficiency In Industrial Plants explores several areas in plant system management on which little has been written, either in texts or technical publications. There's lots of information on cost analysis of comparative electrical systems. Most useful: the chapters on load, demand, and power factor surveys. The author effectively drives home the excessive cost of badly run or poorly planned systems and loads, and suggests remedies.

Electrical Efficiency in Industrial Plants, by Edwin S. Lincoln. F. W. Dodge Corp., 119 W. 40th St., New York 18. 235 pages. $9.50.

Metalworking's Mechanical Press Handbook gives extensive technical treatment to the subject of mechanical presses, their development, and use. Extensively illustrated with photographs and drawings, the book is a helpful reference for the operating man. Engineers and maintenance men should find it an especially useful handbook.

Metalworking's Mechanical Press Handbook. Metalworking Magazine, 221 Columbus Ave., Boston, Mass. 256 pages. $5.

Production Trends in the United States Through 1975, published in March 1957, is supplemented in this new book that estimates the future production in 13 broad sectors of the U.S. economy. Historical figures have been revised back to 1947, and new projections made for 1965, 1970, 1975. Estimates are reported in both 1947 and 1957 dollars. The book is self-contained; needs no reference to the original work to be interesting and useful.

Supplement to Production Trends in the United States Through 1975, by Dr. Bonnar Brown. Stanford Research Institute, Menlo Park, Calif. 61 pages. $2.

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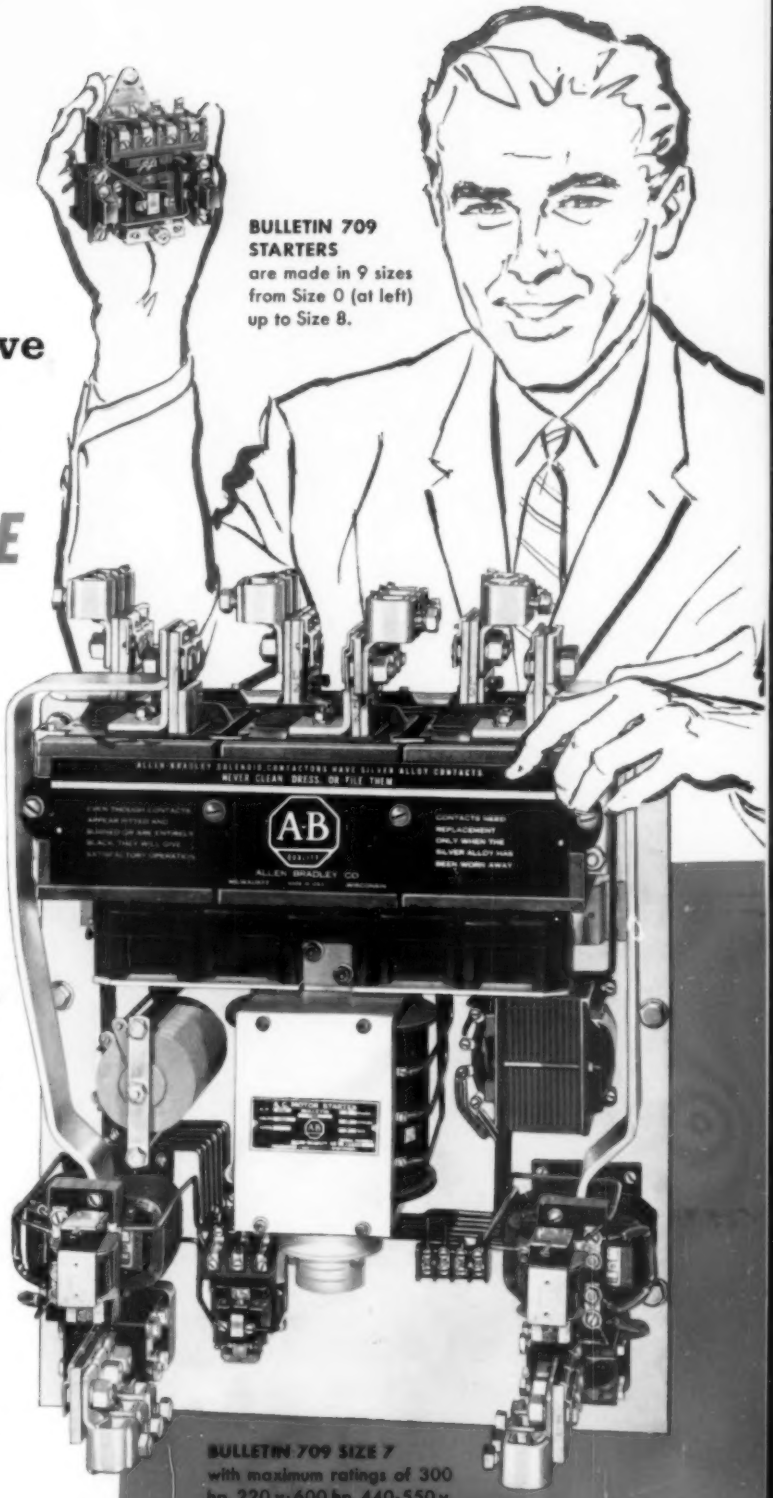

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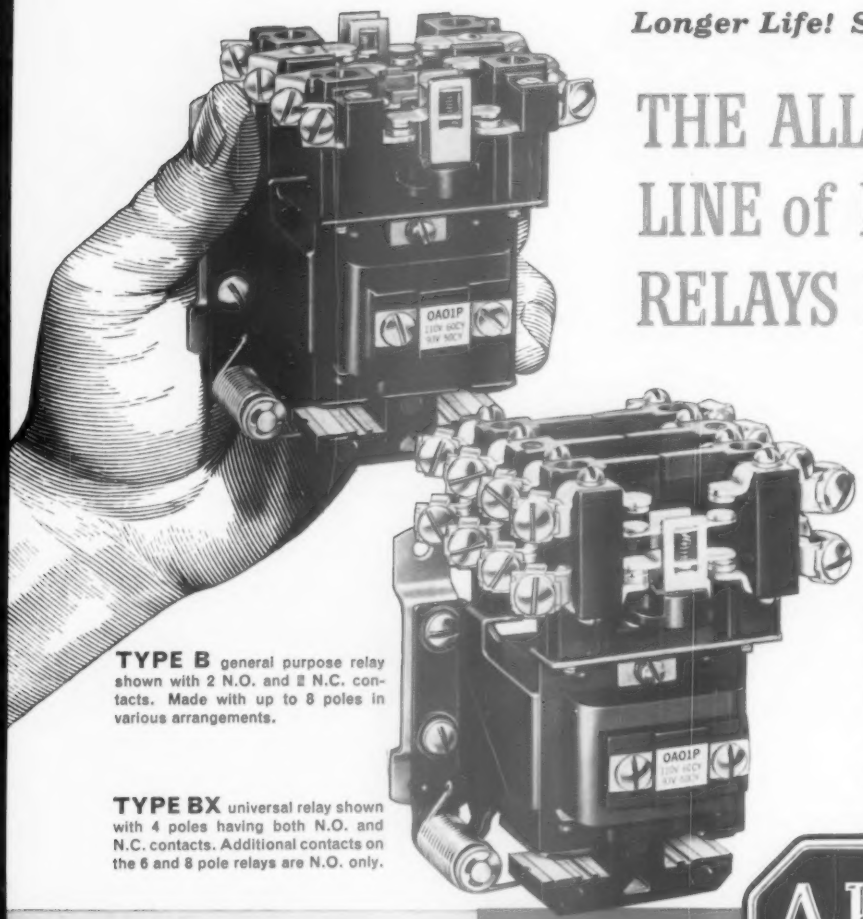

TYPE B general purpose relay shown with 2 N.O. and 2 N.C. contacts. Made with up to 8 poles in various arrangements.

TYPE BX universal relay shown with 4 poles having both N.O. and N.C. contacts. Additional contacts on the 6 and 8 pole relays are N.O. only.

THESE IMPROVEMENTS ARE *IMPORTANT!*

These improved Bulletin 700 Type B and Type BX relays are establishing new standards for relay life and reliability. New design increases mechanical life by *at least 5 times* . . . a new contact motion insures *at least 10 times* greater electrical reliability. Double break, silver contacts never need maintenance, and the new molded coil is impervious to the most severe atmospheric conditions.

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NEW ENCLOSURES

for the Bulletin 700 relays are styled by Brooks Stevens—internationally famous industrial designer. Note the "family" resemblance of these enclosures.

NEMA 1

NEMA Type 1 for general purpose applications with wrap-around cover for ready accessibility. It has a "quality" appearance.

NEMA 4

NEMA Type 4 enclosure for applications that require a watertight and weatherproof seal.

NEMA 7

NEMA Type 7 enclosure for NEC Class 1, Group D hazardous gas locations.

11-60-M

A-B QUALITY

TYPE BR Bulletin 700 convertible contact relay shown with four poles. Made with up to six poles in line.

No other relay offers such simplicity in changing contacts from N.O. to N.C. (or vice versa)—it takes only 60 seconds!

A four pole unit provides any of the contact combinations otherwise available only with five relays of the fixed contact type. You can reduce your relay inventories. In tests, this relay has *proved* it will provide many millions of trouble free operations. Double break, silver contacts never need servicing. Also, each relay can have one or two complete and full rated contacts added to its base—in the field—without increasing space requirements. If you don't know about the Type BR relay, let's get acquainted.

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FACTORY FILMS

The Principles and Applications of Work Sampling demonstrates the need for work measurement and tells how work studies are conducted. Shows many applications of this important do-it-yourself technique. These include how to determine which operations should be included in cost-reduction programs, applying results to cost and accounting, as well as developing realistic estimates of manpower and equipment requirements. 16mm, b&w, sound, 20 min. Write to:

Industrial Education Film Library, 3 Palmer Sq., Princeton, N. J.

How to Harness a Ram describes the use of hydraulic power in such jobs as raising crates, boxes, and barrels from floor to motor carriers, sustaining stock-pile levels in machine feeding operations, etc. Film strip includes about 100 photographs of platform lifts and dock leveling ramps used in many plants. Sound slide film, 15 min. Write to:

Globe Hoist Co., E. Mermaid Lane & Queen St., Philadelphia 18.

Inspection, Maintenance and Operation of Automatic Sprinkler Systems dramatizes importance of these systems in fire protection and control. The film demonstrates procedures common to all systems, with emphasis on the wet pipe, dry pipe, and deluge systems. 16mm, color, 25 min. Write to:

United World Films, Inc., 1445 Park Ave., New York 29.

Die Casting: How Else Would You Make It? shows die-casting process and its place in the metals fabricating industries. Explains uses of various metals—zinc, aluminum, magnesium, brass—and advantages (or disadvantages) of other ways of working metals, such as sand casting, forging, etc. 16mm, color, sound, 35 min. For loan, write:

Modern Talking Picture Service, 3 East 54th St., New York 22.

Selected Motion Pictures 1960-1961 is a 44-page catalog describing many free and rental 16mm motion pictures in various fields. Write:

Association Films, Inc., 347 Madison Ave., New York 17.

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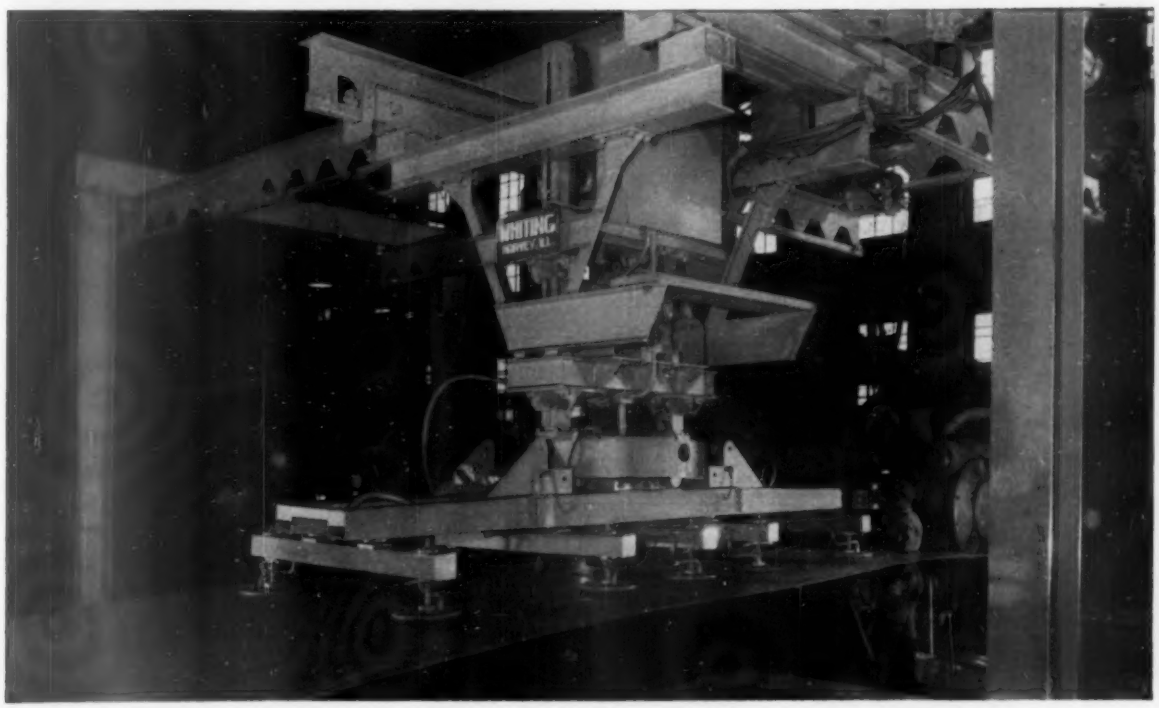

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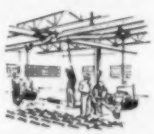

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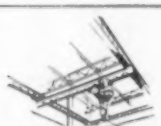

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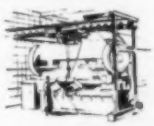

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ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

MATERIALS HANDLING

275—Hoists. Booklet lists full line of hand, electric chain, and wire rope hoists. Chisholm-Moore Hoist Div.

276—Storage Racks. Catalog offers complete range of storage and material handling racks. Equipment Mfg. Inc.

277—Bulk Containers. Report (32 pages) has the answers for solving bulk material problems. Tote System, Inc.

278—Hoists. Here's a bulletin on Job-Mated hoists. From 250 lb. to 20 tons. Shepard Niles Crane and Hoist Corp.

279—Self-Dumping Hoppers. Tells how to cut handling costs by 50%. Hoppers in 8 sizes. Roura Iron Works, Inc.

280—Batteries. Booklet, "Why We Use Battery-Electric Industrial Trucks," is free. Gould-National Batteries, Inc.

281—Steel Shelving. Brochure illustrates simple, adjustable, rapidly-assembled line. Borroughs Mfg. Co.

282—Lift Trucks. Booklet, "Captures Lost Space", describes new narrow aisle stacking truck. Towmotor Corp.

283—Tote Boxes. Bulletin 0-11 gives data on line of vulcanized fiber boxes. National Vulcanized Fibre Co.

284—Tote Pans. Catalog lists complete line, sizes, in one-piece fiber glass molded construction. G. B. Lewis Co.

285—Reach-Fork Truck. Bulletin gives full data on new 4000-lb. narrow-aisle tiering truck. The Raymond Corp.

286—Pallets, Platforms. Bulletin 900 illustrates standard and other handling systems. Powell Pressed Steel Co.

287—Trolley Conveyors. Book 2330 has complete details on custom-tailored systems, components. Link-Belt Co.

288—Industrial Lifts. Write for information on Oildraulic Levelator lifts. 6000 to 300,000 lbs. Rotary Lift Co.

289—Monorail, Cranes. "Cost-Cutting With Monorail and Cranes," 52 pages, illustrated. Louden Machinery Co.

290—LP-Gas Carburetors. Literature tells how to reduce forklift truck costs. Marvel-Schebler Products Div.

291—2-Way Radio. "Materials Handling 2-Way Radio Fact Kit" is free. Gives complete data. Motorola, Inc.

292—Lift Trucks. Catalog covers Cargo-Scout narrow-aisle lift trucks. Four models. Elwell-Parker Electric Co.

293—Tote Boxes. Catalog lists line of food-handling boxes, racks and dollies. Wear-Ever Aluminum, Inc.

294—Conveyor. Brochure gives complete facts about new continuous, vertical conveyor. Standard Conveyor Co.

295—Hand Hoist. Bulletins DH-164, DH-345 for information on aluminum and steel hoists. Wright Hoist Div.

296—Conveyors. Catalog CD-B covers chainless and cable-way types. Capacities, other data. American Monorail Co.

297—Cranes. Bulletin C-42 on "job-engineered" overhead traveling cranes for various uses. Harnischfeger Corp.

298—Electric Hoists. Bulletin H-20 gives facts and features on wire-rope electric hoists. Harnischfeger Corp.

BUILDING

299—Plant Sites. "Plant Location Services" pamphlet has facts on 100% financing. Pennsylvania Dept. of Commerce.

300—Trackage. Track Kit FA-11 illustrates all elements needed for efficient industrial siding. L. B. Foster Co.

301—Grating. Here's new catalog that provides structural data, suggests various applications. The Globe Co.

302—Plant Sites. Data on manufacturers' production capacities in Northern Plains States. Northern Natural Gas Co.

PRODUCTION

303—Visible Records. Here are folders on systems for inventory and production control. Acme Visible Records, Inc.

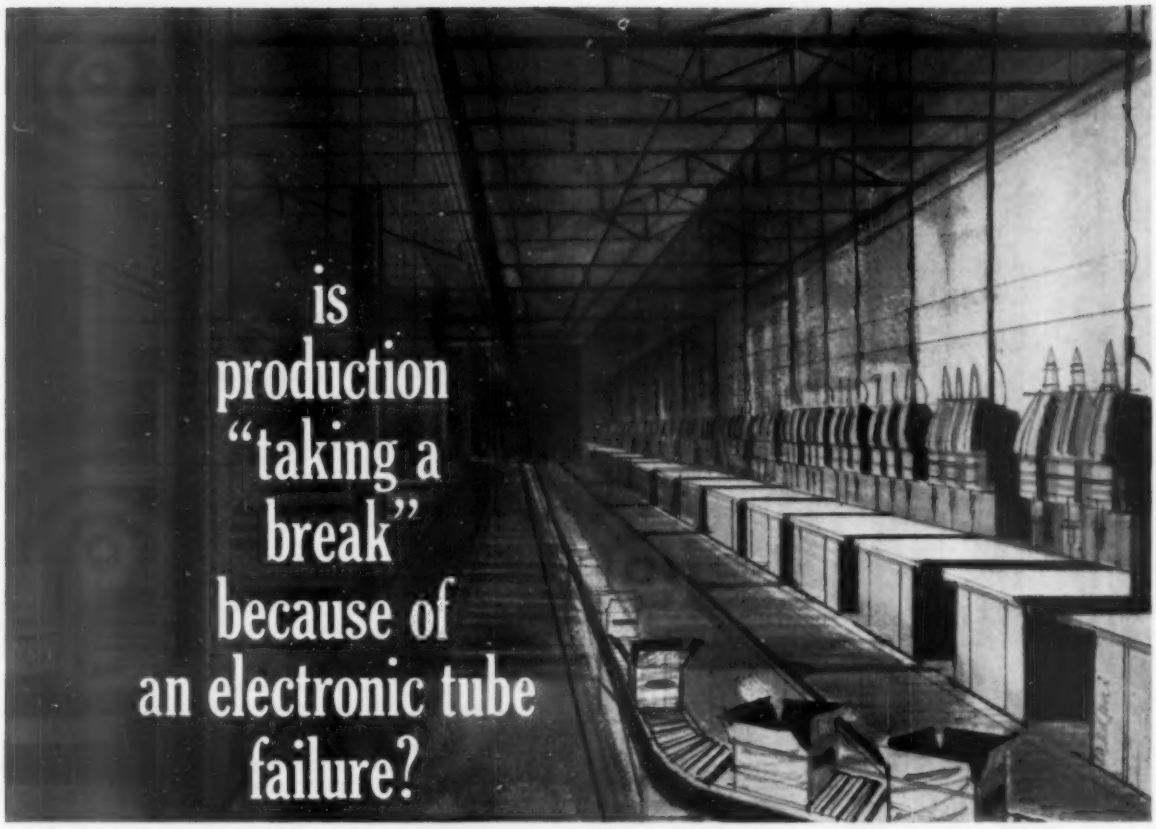
304—Drill. Full information on new 2-speed drill: ranges from 250 to 500 rpm. The Black & Decker Mfg. Co.

305—Finishing Systems. Catalog A-660 contains data on complete product-finishing systems. The R. C. Mahon Co.

306—Air Tools. Bulletin 56 lists complete line, including vertical air grinder (6000 rpm). The Rotor Tool Co.

307—Spray Guns. Brochure describes hot airless spray system features for product finishing. Nordson Corp.

Turn the page



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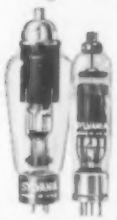

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627	5000	2.5	0.64
628	2500	8.0	2.0
629	350	0.2	0.04
632B	1500	30.0	2.5
672A	2500	40.0	3.2
676	2500	40.0	6.4
677	10000	15.0	4.0
678	15000	6.0	1.6
884	350	0.3	0.075
885	350	0.3	0.075
2050	1300	1.0	0.1
5557	5000	2.0	0.5
5559	1000	15.0	2.5
5560	1000	15.0	2.5
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ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

308—Schedule Boards. Booklet X400 (24 pages) shows application of visual control boards. Graphic Systems.

309—Industrial TV. Write for copy of closed-circuit TV system planning guide. Many applications. Philco Corp.

310—Radial Saw. Catalog includes data on 14x16 in., 16x20 in., and other sizes. Rockwell Mfg. Co., Delta Div.

311—Ferrous Traps. Full information on Erium-powered magnetic types for eliminating tramp iron. Eriez Mfg. Co.

ELECTRICAL

312—Silicones. "Specify Silicone Insulated Motors and Transformers and Save" is helpful booklet. Dow Corning Corp.

313—Gearmotors. Catalog 2747 tells about double, triple, quadruple reductions —up to 100 hp. Link-Belt Co.

314—Lighting Fixtures. Specifications book covers incandescent, other fixtures. RLM Standards Institute, Inc.

315—Magnetic Starters. Bulletin 14-B1 sets forth mechanical and design features, sizes. Furnas Electric Co.

316—Fuses. Bulletin LPCS has data on low-peak fuses, sizes 15 to 600 amperes. McGraw-Edison Co., Bussmann Div.

317—Fuses. Bulletins FIS and HCS cover dual-element and high capacity fuses. McGraw-Edison Co., Bussmann Div.

318—Electrical Connectors. Booklet B-78 gives detailed information on watertight connectors. Joy Mfg. Co.

319—Gearmotors. Catalog No. 201 tells story of new fractional horsepower model. Sterling Electric Motors, Inc.

320—Motors. Bulletin GEA-7092 on Tri-Clad "55" motors that won't burn out from overheating. General Electric Co.

MECHANICAL

321—Spacer Coupling. Service Manual 4838 on quick-connecting, disconnecting spacer coupling. The Falk Corp.

322—Speed Reducers. Bulletin (64 pages) gives capacities, output speeds, selection tables. Dodge Mfg. Corp.

323—Speed Reducers. Catalog 2751 gives complete data and sizes of helical gear speed reducers. Link-Belt Co.

Turn the page

If you can't eliminate drips...
prevent slips with **SOL-SPEEDI-DRI®**

Cleans, slip-proofs floors in a jiffy!

Here's low-cost accident insurance in a bag! Spread amazing SOL-SPEEDI-DRI carpet of safety on with a rake or broom...thirsty granules *pull deep deposits of oil, grease or liquid out of floor.*

Leave on, or remove and *reuse* until saturated! Mineral...won't burn! Each lb. contains over 13 acres of absorptive surface area. *... and no dust problem with SSD!*

Write today for generous **Free** *sample!*

SPEEDI-DRI DIVISION

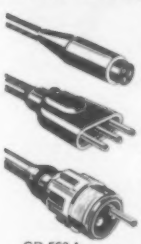
Minerals & Chemicals Philipp CORPORATION

180 Essex Turnpike, Menlo Park, N. J.

For more facts Circle 541 on Reader Service Card

WATERTIGHT AS A SUBMARINE!

ELECTRICAL CONNECTORS



"Submarine" performance, indeed! JOY Electrical Connectors were installed on wartime subs to withstand deep sea pressures, even during depth charges. They are used on today's nuclear subs to feed power while in port.

The secret of such watertightness is JOY's special 2-way "cork" and "interference" seal. The result is a continuous sealed surface at the point of connection.

To learn more about JOY performance, write for

CD 560.1 **FREE BULLETIN B-78.**

JOY ELECTRICAL PRODUCTS DIVISION

1245 Macklind Ave., St. Louis, Mo.

Exec. Offices, Henry W. Oliver Bldg., Pgh., Pa.

For more facts Circle 542 on Reader Service Card

FOR COPPER, BRASS and ALUMINUM . . . INSIST ON

TOLEDO®

Quality Checked

TUBING TOOLS

TUBING CUTTERS
Range ⅛" thru 4 ⅛" O.D.

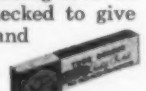
TUBE & FITTINGS CLEANED, DEBURRED
All Sizes thru 4"

FLARING, SWAGING
Range ⅛" thru 1⅛" O.D.

LEVER-TYPE BENDERS
Range ¼" thru ⅞" O.D.

- ✓ **NEW, Advanced Features**
- ✓ **Long Service Life**
- ✓ **Smooth, Easy, Accurate**

For all copper, brass and aluminum tubing, Toledo offers fine precision made tubing tools at popular prices. Toledo Quality Checked to give you better on-job performance and long service life to help you increase job-profit dollars.



(SOLD THRU AUTHORIZED "TOLEDO" DISTRIBUTORS)

Write For New Catalog

TOLEDO® *Quality Checked*

PIPE THREADERS • WRENCHES • MACHINES • TUBING TOOLS

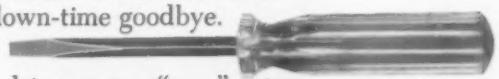
THE TOLEDO PIPE THREADING MACHINE CO...TOLEDO 3, OHIO

For more facts Circle 543 on Reader Service Card

but what do horses know about valves?

You know from bitter experience that when pipe chips, boiler scale or other hard particles catch between wedge and seat, the wedge will be damaged and the seat will be scored. You have to replace both wedge and seat or dump the valve. And no horse can tell you different!

But, if you've installed FAIRBANKS RENEWABLE SEAT RING GATE VALVES, you kiss down-time goodbye. (PATENTED)



Because a set of seat rings and a screw driver puts a "new" gate valve on your line in minutes. And, you don't ever remove the valve body from the line!

That's why it's so important to you to know that no other valve in the world looks like this when you remove the bonnet. No other gate valve gives you such savings in down-time, maintenance time and inventory costs.

Yours on Request: Informative, colorful brochure giving complete facts about Fairbanks Renewable Seat Ring Gate Valves. Write without obligation.

THE **Fairbanks** COMPANY

Executive Office: 393 Lafayette Street, New York 3, N. Y.

520 Atlantic Avenue, Boston 10, Mass. — 2600 S. Throop Street, Chicago 8, Ill. — 393 Lafayette Street, New York 3, N. Y. — 15 Stanwix Street, Pittsburgh 22, Pa. — 202 Division Street, Rome, Georgia

FACTORIES: Binghamton, N. Y. and Rome, Ga.

For more facts Circle 544 on Reader Service Card

ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

324—Speed Reducers. Catalogs 2324-A and 2724 cover worm gear and universal worm gear types. Link-Belt Co.

325—Speed Reducers. Catalogs 2618 and 2619 have details on shaft-mounted and parallel shaft types. Link-Belt Co.

326—Fluid Drives. Catalog 2747 contains full descriptive data and specific applications. Link-Belt Co.

327—Speed Changers. Catalog 2274 gives complete information on variable speed drives. Link-Belt Co.

328—Roller Chains, Sprockets. You'll want Book 2657 for data on single- and double-strand types. Link-Belt Co.

PLANT SERVICES

329—Drinking Fountains, Coolers. Catalog lists floor, indoor, outdoor, wall-mounted models. Halsey W. Taylor Co.

330—Acoustic Phone Booths. Bulletin A-142-4T gives full descriptive data and prices. Burgess-Manning Co.

331—Air Conditioning. Write for "Will Factory Air Conditioning Pay Off for Me?" Carrier Air Conditioning Co.

332—Shop Equipment. Here's a list of benches, desks, stools, chairs, shelving. Columbia-Hallowell Div., SPS.

333—Fans. Bulletin F-104 tells about moderate-pressure ventilating, air conditioning, cleaning. Buffalo Forge Co.

334—Fans. Bulletin FD-205 gives details on type "CR" fan for heavy-duty service. Buffalo Forge Co.

335—Exhausters. Bulletin FI-110 on special units that will move hot gases from 200 to 850 F. Buffalo Forge Co.

336—Washfountains. Catalog No. 6004 lists complete line of foot-control washfountains. Bradley Washfountain Co.

337—Pumps. Booklet 955 gives full data on features of clear water, double-suction pumps. Buffalo Forge Co.

338—Pumps. Booklet 953 gives details on non-clogging types for corrosive, abrasive liquids. Buffalo Forge Co.

339—Chemical Liquid Pumps. Bulletin 976 lists several types in wide variety of trim. Buffalo Forge Co.

340—High-Pressure Pumps. Catalog 980 covers pumps to operate against heads as high as 1500 ft. Buffalo Forge Co.

Turn the page

Time is Money!

WAYNE POWER SWEEPERS SAVE BOTH

You can take an enormous slice out of plant maintenance expense with a switch to Wayne power sweeping! With a Wayne Sweeper, one man can sweep up to 125,000 square feet of plant area per hour *–50 times more than one man with a pushbroom!* Wherever dirt and debris accumulate – inside or out – a Wayne slicks up faster, easier, cleaner – *for less!*

To match the machine to *your* plant sweeping job, Wayne makes Power Sweepers in sizes and capacities to meet every plant requirement. *Put your plant cleaning on a paying basis with a switch to power. Write Wayne for full details today.*

WAYNE

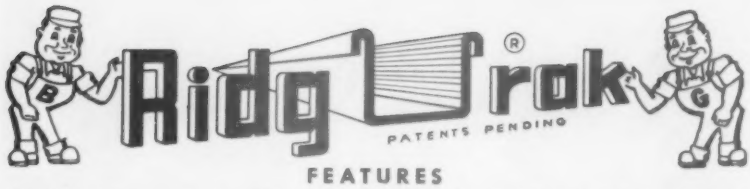
THE WORLD'S LEADING MANUFACTURER OF POWER SWEEPERS FOR CITIES AND INDUSTRY

WAYNE MANUFACTURING CO.
3701 EAST LEXINGTON STREET, POMONA, CALIFORNIA

Send me a copy of your Power Sweeper brochure

Name_____

Attach to company letterhead and mail



FEATURES

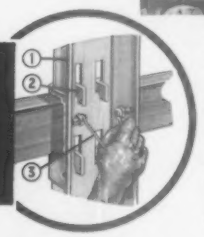
Quick Connect or Disconnect Triple Locked Connection

SOME RECENT RIDG-U-RACK INSTALLATIONS

X | JOS. M. ZAMOISKI CO., Baltimore, Md.
Premium Corp. of America, Denver, Colo.
Fedders Corp., Buffalo, N. Y.
International Harvester Co., Hinsdale, Ill.
Behr Manning Co., Troy, N. Y.
Majestic Electrical Supply Co., Skokie, Ill.

Ridg-U-raks provide 6 level rug storage at Jos. M. Zamoiski Co., Baltimore, Maryland

RIDG-U-RACK LOCKED 3 WAYS
1. External Flanges stop side motion
2. Double Hooks stop down motion
3. Pinch Pins stop vertical motion

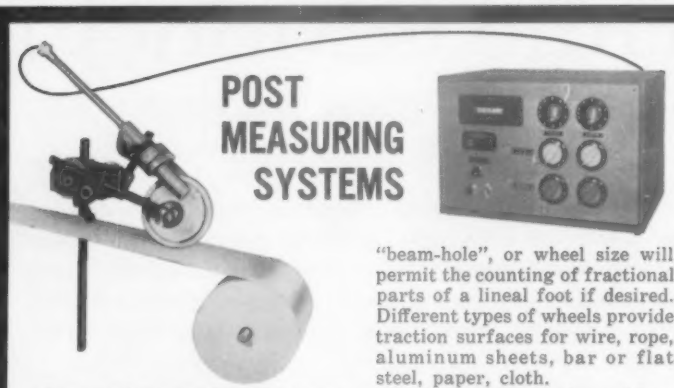


Every Ridg-U-rak connection is locked three ways to provide strength, rigidity, ease of erection and expansion or re-assembly. Fabricated Upright Frames with external column flanges and Beams with integral double hook pads, fully standardized, meet any storage need.

For a description of Ridg-U-raks, write for Catalog 107— KF

BERNARD GLOEKLER NORTH EAST CO.
NORTH EAST, PA.

For more facts Circle 546 on Reader Service Card



POST MEASURING SYSTEMS

Connected to any Post Decitron electronic counter, the new lineal footage device permits accurate length measurement for continuous production items.

Each time the wheel revolves, a photolight beam is broken and a count equal to one foot is registered by the counter. Varied "beam-hole", or wheel size will permit the counting of fractional parts of a lineal foot if desired. Different types of wheels provide traction surfaces for wire, rope, aluminum sheets, bar or flat steel, paper, cloth.

Used in conjunction with a Post Decitron "Preset" counter, (i.e. PW-2) a predetermined length of stock can be measured, and "marked" or cut-off as desired.

Ideal for labels and paper making where footage is most accurate measure of production.

Decitron

POST ELECTRONIC PRODUCTS

Division of Reid Brothers Company, Inc.
12 LOTHROP ST. / BEVERLY, MASS.

For more facts Circle 547 on Reader Service Card

ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

341—Close-Coupled Pumps. Bulletin 975 describes models for vertical, horizontal installations. Buffalo Forge Co.

342—Shop Equipment. Brochure tells about "world's most diversified line of steel equipment." Lyon Metal Products.

343—Dust Filters. Catalog 104 has 36 pages on bag-type filters used in many installations. W. W. Sly Mfg. Co.

344—Meters. Liquid measuring meters are described and illustrated in booklet No. 43. Buffalo Meter Co.

345—Dust Collectors. Here's a 52-pager that covers fume and dust control systems. Kirk & Blum Mfg. Co.

346—Metal Hose. Catalog ID-100D gives technical data on flexible hose products. Universal Metal Hose Co.

347—Incinerators. Technical bulletins on no-smoke, no-odor incinerators, with applications, are free. Joseph Goder.

348—Aftercoolers/Separators. Write for new Bulletin 714 for data on air-actuated equipment. R. P. Adams Co.

MAINTENANCE

349—Paint. Booklet, "How to Put Color to Work," has 28 pages on painting program. E. I. du Pont de Nemours & Co.

350—Protective Coatings. Here's technical literature with answers for corrosion problems. Lion Oil Co.

351—Power Sweepers. Brochure on sweepers with sizes and capacities for specific requirements. Wayne Mfg. Co.

352—Tubing Tools. New catalog lists sizes for copper, brass, and aluminum. Toledo Pipe Threading Machine Co.

353—Vacuum Cleaners. Catalog No. 155B illustrates built-in systems and portable types. Spencer Turbine Co.

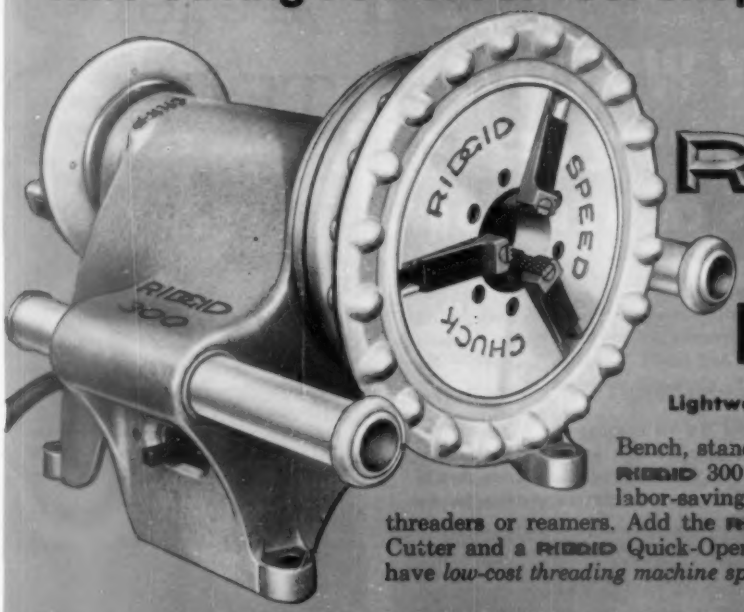
354—Combination Scrubber/Vac. Literature describes labor-saving features, other benefits. Finnell System, Inc.

355—Maintenance Tools. Catalog P-9 shows how to use hydraulic "push-puller" tools. Owatonna Tool Co.

PACKAGING/SHIPPING

356—Staple Nailer. Manual FT-9 on air-powered, lightweight gun for driving 16-gauge staples. Fastener Corp.

Time-Saving Power For Your Shop or on the Job . . .



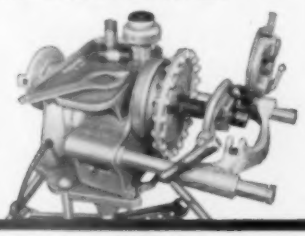
New RIDGID® 300 Power Drive

Lightweight • Versatile • Low In Price

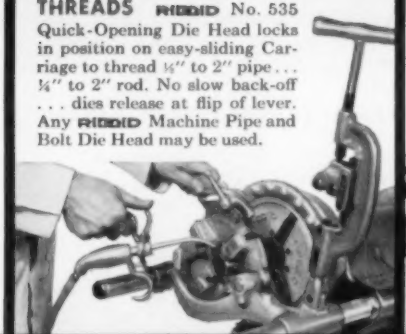
Bench, stand or truck mounted, this compact RIDGID 300 Power Drive gives you time and labor-saving power for your hand cutters, threaders or reamers. Add the RIDGID No. 310 Carriage, No. 360 Cutter and a RIDGID Quick-Opening Machine Die Head, and you have *low-cost threading machine speed and ease!*

Here's What it Does!

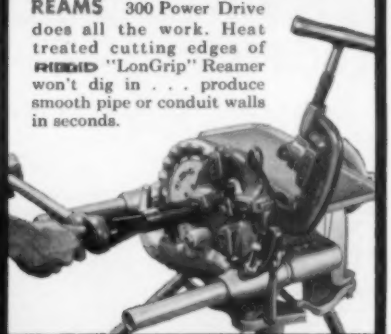
CUTS RIDGID No. 360 Cutter, shown here, cuts ⅛" to 2" pipe and conduit — up to ⅜" rod. Extra-wide rolls keep cutter straight for perfect high-speed tracking. Cutter stays back out-of-way when not in use.



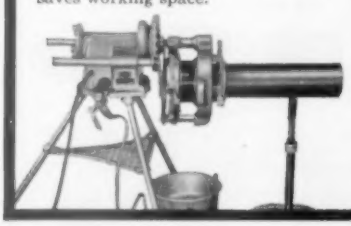
THREADS RIDGID No. 535 Quick-Opening Die Head locks in position on easy-sliding Carriage to thread ½" to 2" pipe . . . ¼" to 2" rod. No slow back-off . . . dies release at flip of lever. Any RIDGID Machine Pipe and Bolt Die Head may be used.

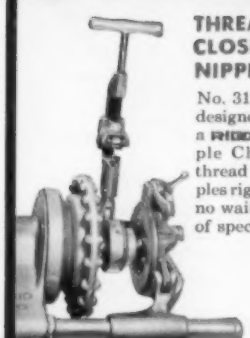


REAMS 300 Power Drive does all the work. Heat treated cutting edges of RIDGID "LonGrip" Reamer won't dig in . . . produce smooth pipe or conduit walls in seconds.



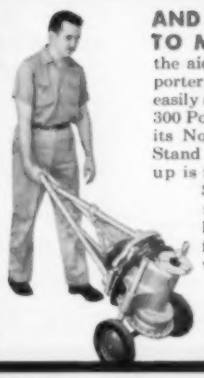
DRIVES GEARED THREADERS Compact, RIDGID No. 300 Power Drive has plenty of power for up to 12" geared tools. New RIDGID Close-Coupled drive shown here, for Nos. 141 and 161 Jam-Proof Threaders eliminates Universal Drive Shaft . . . saves working space.





THREADS CLOSE NIPPLES

No. 310 Carriage is so designed that by using a RIDGID No. 19 Nipple Chuck you can thread even close nipples right on the job... no waiting for nipples of special lengths.



AND IS EASY TO MOVE With the aid of the Transporter, one man can easily move a RIDGID 300 Power Drive with its No. 1206 Folding Stand attached. Set-up is fast and easy. Stand's integral tool tray locks legs in position, forming rigid work base.

Save Time and Increase Your Profits on Every Job. See and Try This Biggest "Threading Machine" Bargain at your Supply House!

RIDGID®

The Ridge Tool Company, Elyria, Ohio, U.S.A.

E. G. Wolf, Jr.,
Supervisor Plant Engineering,
Hussmann Refrigerator Co., St. Louis, *tells*

"WHY WE CHOSE CENTURY LP-GAS CARBURETION"

SERVICE

"...we were experimenting with two identical lift trucks, one on LP, the other on regular gasoline. We needed help on the proper type of LP conversion and how to maintain and operate the equipment for best results. The authorized Century Distributor delivered the goods with on-the-spot help."

PARTS

"...we soon learned that the extensive Century national distributor set-up for service and parts was to be of tremendous help. The local Century Distributor carries a complete stock of all parts necessary to keep us in continuous operation. And the quality of personnel proved to be a time saver too."

EDUCATION

"...the local Century distributor has complete facilities for educating our operators and other plant personnel on the care and operation of our LP vehicles. They have regular school-clinics with demonstrations and instructive literature."

APPROVED EQUIPMENT

"...once again Century scored with us. Not only does their exclusive fuel metering value carburetor provide easy starting and smooth idling but we found the equipment FACTORY MUTUAL APPROVED."

NORTHWESTERN — SOUTH CENTRAL — SOUTHWESTERN AREAS

ARIZONA
Suburban Gas Service,
3111 Grand Avenue, Phoenix

ARKANSAS
Arkansas Foundry,
1423 E. 6th Street,
Little Rock
Butane Carburetion Co.,
P. O. Box 677, El Dorado

CALIFORNIA
Cal-Gas Equipment Company,
P. O. Box 5052, Sacramento 17
Calor Gas Equipment Company,
1276 Wishon Avenue, Fresno
Campora Gas & Appliance,
P. O. Box 868, Mariposa Rd.,
& Hwy. 99, Stockton
Coast Gas Service,
P. O. Box 174, Watsonville
Gas Tools, Inc.,
S. Maple Ave. & Hwy. 99,
P. O. Box 1506, Fresno
Gray's Butane, Inc.,
106 W. Elm, Lodi
A. B. Kamps LP-Gas & Appliances,
336 West Main, Ripon
L. O. McClure & Sons,
1131 Thirty-Third Street,
Bakersfield
Petrolane Gas Service, Inc.,
P. O. Drawer 1410, Long Beach
Suburban Gas Service
2020 N. Town Avenue, Pomona
Weaver Gas Service,
1687 S. First Street, San Jose
Western Lift Truck,
348 W. Weber Avenue, Stockton
Western Lift Truck,
21031 Western Blvd.,
Hayward, Calif.

COLORADO
Central Auto Electric Company,
12th Avenue & Lincoln St.,
Denver

LOUISIANA
Ralph Brandon Company,
P. O. Box 6336, Shreveport
General Gas Corporation,
P. O. Box 2271, Baton Rouge
Motor Fuel Equipment,
Box 10086, New Orleans
S & R Gas Company,
P. O. Box 608, Coushatta

NEW MEXICO
Carlsbad Gas & Appliance,
P. O. Box 446, Carlsbad

OKLAHOMA
Collins-Butane-Propane Co.,
216 E. Central, Ponca City
Tom Gorman Company,
P. O. Box 5085, Tulsa
Sooner Gas Supplies,
1611 North Portland,
Oklahoma City

TEXAS
Brownie Butane & Propane,
McAllen
Central Butane Company,
2225 LaSalle, Waco
Dixie Butane Gas Co.,
4601 Avenue H, Rosenberg
Flash-O-Gas,
P. O. Box 32, Plainview
General Tank & Equipment,
P. O. 10386, San Antonio
Gray Butane Sales Co.,
P. O. Box 369, Harlingen
Ikard & Newsom Anthony,
Northwest Butane Gas Co.,
P. O. Box 14316, Dallas
Superior Manufacturing Co.,
4110 N. E. 8th Ave., Amarillo
Tatum Butane, Inc.,
P. O. Box 1188, Pecos
Joe Thompson Implement Co.,
P. O. Box 7, Abernathy
White Tucker Company,
2310 Canada Dry Street, Houston
Yearwood Butane,
Box 605, Fabens, Texas
York Maintenance Company,
P. O. Box 12385, Houston 17

WASHINGTON
Puget Sound Propane,
10990 E. Marginal Way, Seattle

CANADA
Auto Electric Service Co.,
Toronto, Ontario
Canadian Propane Limited,
463 Dawson Road,
St. Boniface, Manitoba
James Petroleum,
70th Ave. & Macleod Trail,
Calgary, Alberta

Send for free literature.

Export Sales: Sin Par Automotive Div.
Singer Products Co.
90 Broad Street
New York 4, N. Y.

CENTURY®
LP-GAS CARBURETION

BW

CENTURY GAS EQUIPMENT
Marvel-Schebler Products Div.
Borg-Warner Corporation
Decatur, Illinois

LOOK, BOSS... KENNETTS ARE

They're made of National Vulcanized Fibre, a cellulosic plastic. Come in a "jillion" styles and sizes for any materials handling need.

Get the full, cost-cutting Kennett story now. Write for Bulletin O-11 today.

KENNETT
RECEPTACLES BY
NATIONAL
VULCANIZED FIBRE CO.
WILMINGTON 99, DELAWARE

For more facts Circle 549 on Reader Service Card

Circle 550 on Reader Service Card

Here's "in-plant" proof that BOSTITCH STAPLING sends costs down

CUTS FABRIC FASTENING COSTS 90%
Fastening webbing to wire frame of shopping baskets proved three times faster when Bostitch Stapling was used compared to the old method. And costs were only one-tenth as much.

SIMPLIFIES WIRE LEAD ARRANGEMENT
Two Bostitch Stitchers are used in thermostat production to fasten electrical control leads to mercury cells. Stapling helps minimize wire arrangement, speeds up assembly.

INCREASES PREFAB PRODUCTION
By stapling cedar shakes to undercourse in four to eight foot strips, this prefab builder applies shingle siding almost as fast as clapboard. Time saved over old method, 60%.

This is "in-plant" proof that Bostitch may profitably become a part of your product and give you the benefits of simplified design, increased production, or even an improved product. Call your Bostitch Economy Man—one of 350 in 123 U. S. and Canadian cities—he can probably help you use Bostitch stapling to your advantage. Call him today. Or write to us at the below address.

Fasten it better and faster with **BOSTITCH®**
STAPLERS AND STAPLES

611 Briggs Drive, East Greenwich, R. I.

...be heard there!

A "Hear Here" Acousti-Booth guards telephone conversations . . . *shuts out noises* that garble speech and muddle hearing . . . provides privacy.

Why tolerate mistakes and misunderstandings? There is an Acousti-Booth model for every location.

Acoustical Performance Guaranteed

For descriptions and prices ask for Bulletin No. A-142-4T

BURGESS-MANNING COMPANY

Architectural Products Division

749 East Park, Libertyville, Ill.

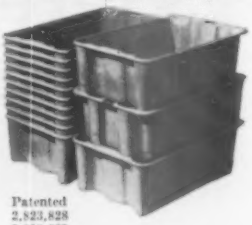
For more facts Circle 552 on Reader Service Card

LEWIS TOTE PANS

are

STRONG

One-piece fiberglass molded construction; can't rust, rot, dent or bend. Stack-n-Nest® pans handle up to 3000 lbs. safe static load. Available in 8 sizes, three attractive molded-in colors.



Patented
2,823,828
2,823,829

LIGHTWEIGHT

Lighter than an aluminum pan of the same size, these general purpose Lewis fiberglass pans handle bigger payloads with less effort.

. . . versatile

This Stack-n-Nest® truck is only one of the many different Lewis containers, each designed for a variety of handling operations. There are trays, pans, boxes, and trucks to fit all your handling requirements.

SEND FOR THE BIG LEWIS CONTAINER CATALOG TODAY

Shipment Within 24 Hours From Receipt of Order

G. B. Lewis COMPANY

1211 MONTGOMERY STREET • WATERTOWN, WIS.

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Loosens FROZEN PARTS FAST!

Handy
Won't Leak
Shoots 3 Feet

Same formula as famous Kroil that has pleased 14,000 industrial users for 10 years or more.

Loosens stuck together metal parts, bushings, bearings, bolts, screws, pipe, etc., "anything from an embalmer's needle to a bulldozer," one customer said.

"Like an extra employee," said another. "Turned rust into mush, put $50,000 equipment back to work."

You too can get these results.

Try Aerokroil at our risk. Send $2 cash, and we'll pay postage.

12-OZ. CAN $2.
F.O.B. NASHVILLE
CASE OF 12 $18.75

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SEARCHLIGHT

Want to Sell?
Want to Buy?
Used Equipment?
Surplus New Equipment?

Check page 280

EMPLOYMENT OPPORTUNITIES

Men for your staff?
Executive, sales or technical positions?
Seeking employment?

Check page 280

INDUSTRIAL CONSULTANTS

Need Professional assistance in solving your most difficult problems

Check page 281

WHERE TO BUY

Special services for Manufacturing plants

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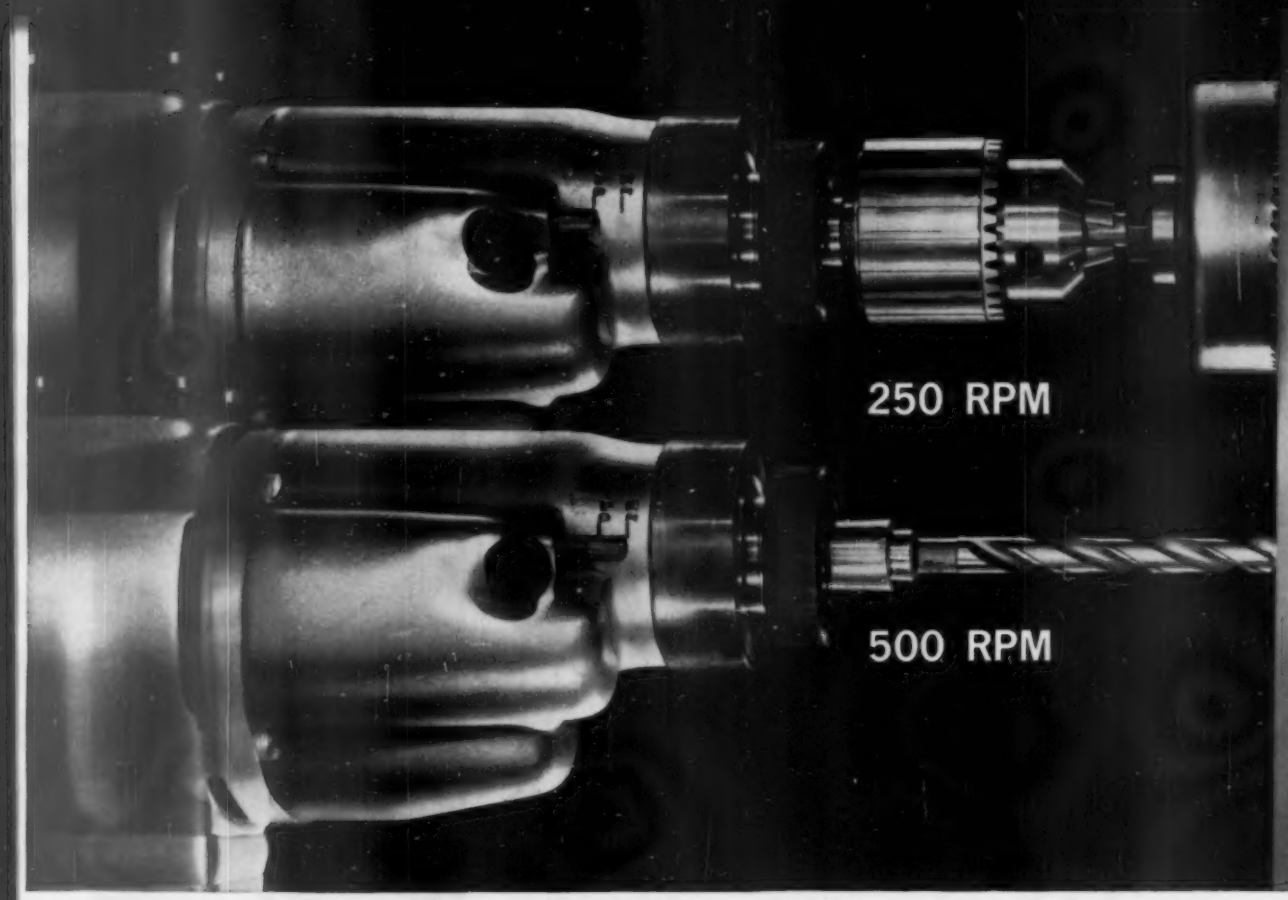

NEW 2-Speed drill has the versatility to do more jobs more efficiently!

Hole sawing . . . masonry work . . . core drilling . . . reaming . . . *any* production drilling job is a cinch with B&D's new precision-balanced Two-Speed Drill. Celebrated B&D engineering even allows you to use this ruggedly built tool as a *separate* power unit. Switch the clutch control and it automatically changes from 500 RPM for high-speed work to 250 RPM for extra-power drilling. Reverses easily too!

You'll appreciate the way B&D reserve power flows out over the heavy-duty roller bearings to give you the *precise* speed for effortless production work . . . the way work speeds through your shop, dramatically reducing your labor and down-time costs. See how B&D's Two-Speed Drill can do your jobs faster, with *less* fatigue . . . with *more* profit! Sold by leading distributors everywhere. *For sales or service look in the Yellow Pages under* TOOLS ELECTRIC

Black & Decker®

CUTS MAN-HOURS TO MINUTES

NEW Two-Speed Black & Decker Magnetic Drill Press

equipped with the new 1¼" Two-Speed unit operates manually or by exclusive remote control. Work against the ceiling, right side up, or sideways. Gets into tight spots easily, rapidly. Also ¾" (single speed) model.

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Company.....

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Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities — Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE

CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.

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CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds and fits in a tool box. CM-Alloy load chain.

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Request catalog and name of local stocking distributor.

CM HOISTS

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For more facts Circle 556 on Reader Service Card

big savings for your finishing department

A PICTURE OF WASTED PAINT. The overspray you see is typical of most old-fashioned spray systems. Fifty per cent or more of the paint never reaches the object to be painted at all.

WITH NORDSON AIRLESS. The same product being sprayed by the same man; but, this time, little or no overspray — paint waste cut 25 per cent or more.

With an ordinary spray system, 600 parts of air are needed to atomize one part of paint. When the spray gun is triggered, the mass of air must go somewhere and it carries with it clouds of paint — much of which goes up the spray booth exhaust stack or settles where it is unwanted.

The Nordson Hot Airless System changes all that. *No* air is used for atomization so overspray is cut to a bare minimum. Important savings are made in both material and labor. Clean-up time is cut to the bone, housekeeping improved. We can show you how to cut painting costs and at the same time get better finish quality. Write for your free copy of the Nordson Hot Airless Spray Brochure.

NORDSON CORPORATION

37 JACKSON STREET • AMHERST, OHIO

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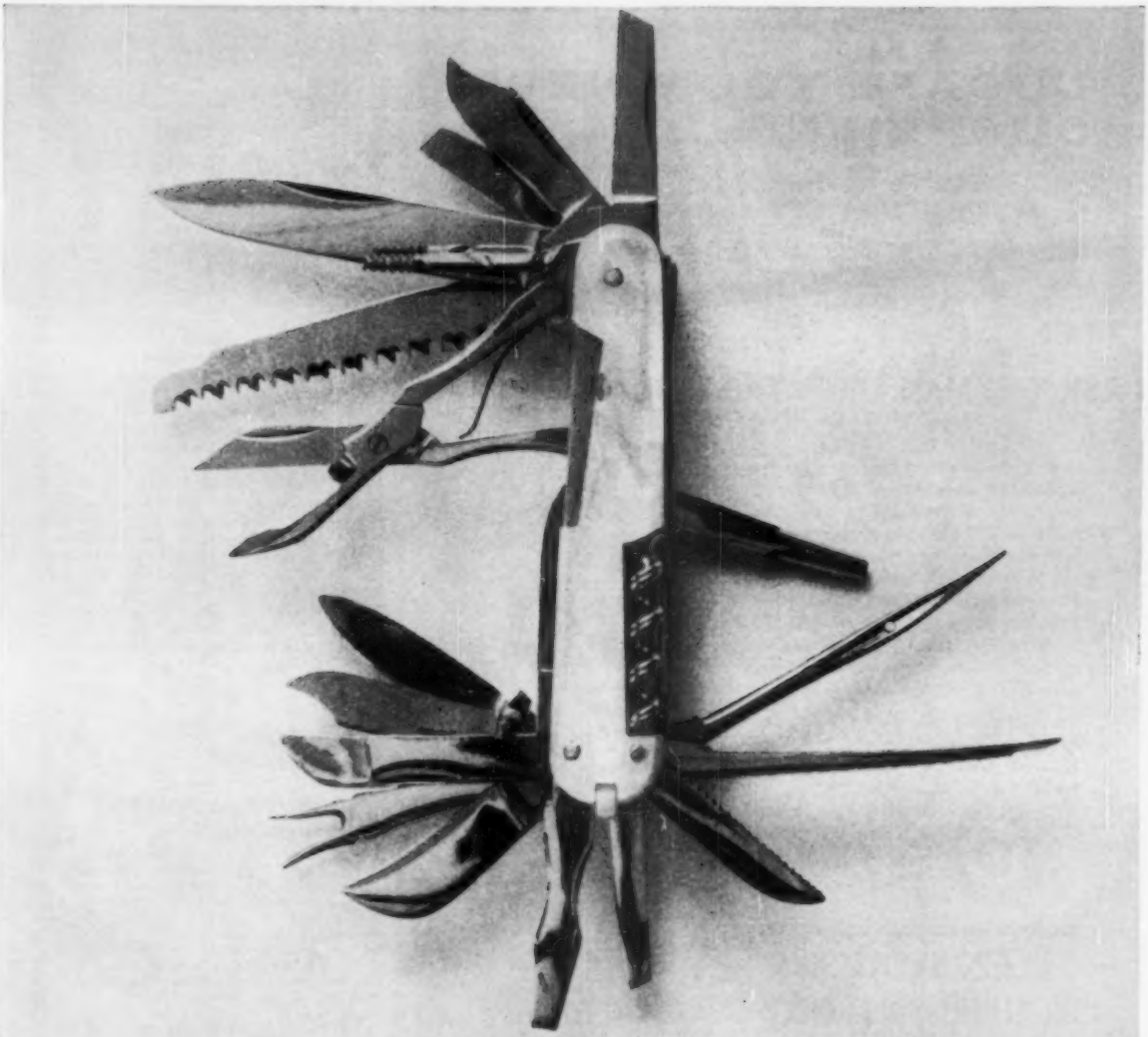

VERSATILE

Here you see an ingenious collection of tools. Yet this superb combination knife cannot compare with INLAND 4-WAY SAFETY PLATE in versatility of performance. In fact, when it comes to describing the range of uses for easy-to-fabricate INLAND 4-WAY, there seems to be no limit.

Users tell us they especially like 4-WAY's versatility made possible by its 3 different raised-lug patterns—small, medium and large; by its 15 different gages from 18 gage up to ¾" thickness; by its range of weights from 2.4 pounds to 31.65 pounds per square foot; and by its availability in widths from 24" all the way up to 72". *For shop use, fleet maintenance, as a basic material in the fabrication of products, as a structural building material, 4-WAY is ideally useful. Write today for your copy of Inland's 4-WAY Safety Plate Booklet.*

available from your steel service center

INLAND 4-WAY® SAFETY PLATE

INLAND STEEL COMPANY
30 W. Monroe St. • Chicago 3, Ill.

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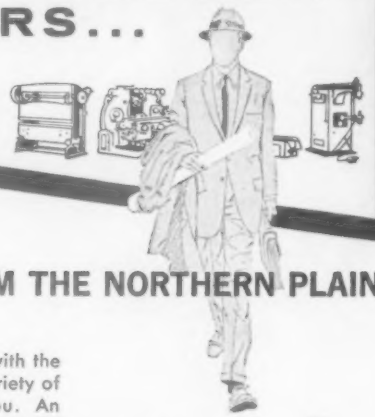
THROUGH THE FACILITIES REGISTER



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to put you in direct contact with the manufacturers whose wide variety of production is available to you. An accurate plant by plant, machine by machine study has been made and electronically tabulated by Northern Natural Gas Company and other natural gas utilities serving the 5 Northern Plains States. Qualified producers are being referred to industry quickly and without obligation.

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Acme Visible Cabinets give you inventory control at a glance

With an Acme Visible Control System on guard, there'll never be shortages in materials or equipment, or spare parts to interrupt the smooth flow of production. Inventory facts are at your fingertips. Visible signals flag your eye whenever an item needs reordering. For full facts on how you can control inventory this easy, efficient way . . . mail the coupon.

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Acme Visible Records, Inc. 3111 W. Allview Dr., Crozet, Va.

To learn how my company can cut costs, increase efficiency—send free folders on systems for: ( ) Inventory Control ( ) Production Control

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By ERNEST DALE

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and LYNDALL F. URWICK

Chairman of the Board, Urwick, Orr, & Partners, Ltd.

How the busy executive can reduce the burdens of his work—and prevent them from growing as the business increases in size and complexity—is clearly explained in this book. Here are answers to such questions as: How can you tap the full potential of every member of your executive staff? What are the potentials—and risks—in having an assistant-to?" How and where can the "clearinghouse principle" of military staff organization be profitably applied in modern business? What can be done to lessen the workload of top executives without infringing upon their personal authority and responsibility? The book shows you in detail how a well-developed staff system enables you to cut wasted effort, eliminate petty worries, and maintain more efficient contact with those under your command . . . giving you more time to exert leadership in planning and meeting long-range company goals. **250 pp., 14 illus., $6.00**

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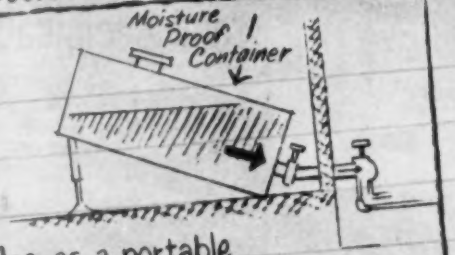
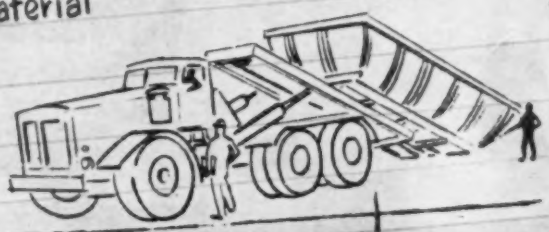
Materials Handling Ideas with the Dempster Dinosaur



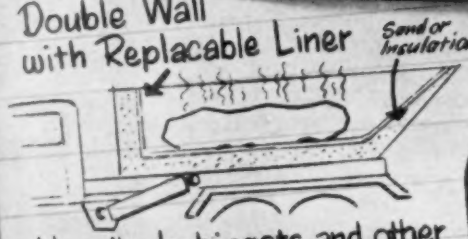
Use as a portable Hopper for temporary storage of wet or dry material

Use as a portable cable reel station - or for handling rolls of paper or steel

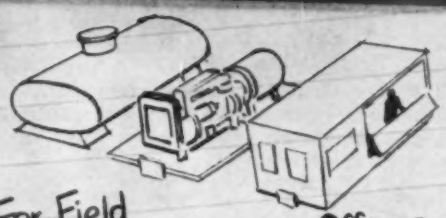


Shift heavy in-plant movements from rails to rubber with Dinosaur and 100,000 lb. capacity trucks... For slag... ingots... stone or chemicals.

Double Wall with Replacable Liner



Handle hot ingots and other materials with insulated containers.



For Field Operations Portable Offices, Tool Sheds, Generators, Fuel Tanks, Compressors etc. can be moved to the site by the Dinosaur.

DEMPSTER BROTHERS offers a New Dinosaur Brochure, Free on Request

DEMPSTER BROTHERS
Inc.
Knoxville 17, Tenn. Dept. F-11

The DEMPSTER DINOSAUR®

No. 6 *in a series of washroom survey comments from "SBS soap counselors"*

We showed them a money-saving approach to washroom maintenance!

James B. Workman,

SBS Soap Counselor on the Eastern Seaboard, has helped many plants update their clean-up practices. Here's his account of a survey at a a leading wire and cable manufacturing plant:

"The condition of the washrooms was not up to their desired standards . . . even though maintenance costs were much higher than they should have been. The culprits responsible were easy to pinpoint: a scrub soap, disinfectant, scouring powder and bowl cleaner—all of them slow-acting, one-purpose agents multiplying labor costs. Maintenance was using all 4 off and on . . . and getting nowhere.

"We approached the problem by demonstrating how much quicker SBS 50 will *clean*, *disinfect*, *sanitize* and *deodorize* fixtures, walls and floors in just one operation. This opened their eyes to SBS 50's effective 4-way action which eliminates duplication of labor, cuts housekeeping costs and creates a hygienic atmosphere employees respect and live up to."

Money-saving suggestions like this *begin* with OPERATION PINPOINT–a thought-provoking presentation filled with facts about skin hygiene and washroom maintenance. The SBS soap counselor serving your area can pinpoint the right soap to do every skin cleansing job best and at lowest cost in your plant. Let him show you OPERATION PINPOINT . . . just call your nearest SBS office, collect.

the washword of industry

SBS

sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J.
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

SAFER! More Practical
around electricity and chemicals

Meet ASA Code A 14.2 for portable metal ladders

Heavy duty fiberglass siderails, high tensile strength aluminum steps and rungs.
NON-CONDUCTING!
NON-ABSORBENT! Exclusive Alco-Lite construction adds strength and safety. Light and strong as an all-aluminum ladder. Safe around high voltages, more practical around chemicals, acids, fumes, gases. Send for ILLUSTRATED CATALOG.

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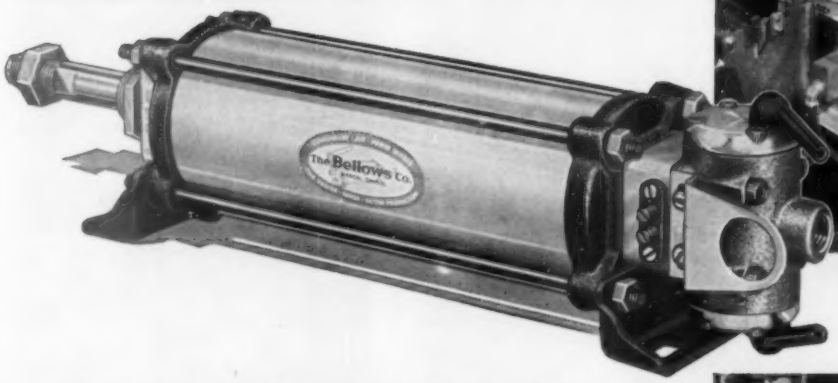
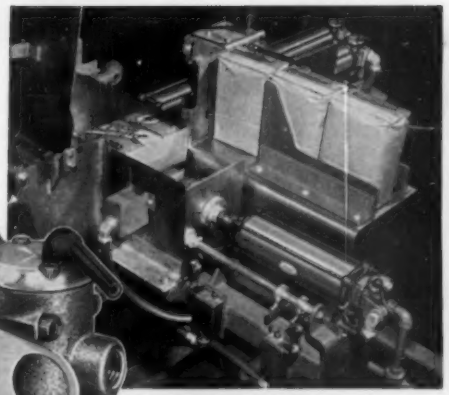
with the

BELLOWS AIR MOTOR®





Packaging coffee is simplified by this Bellows Air Motor powered equipment.

...you can build special machines ...or modernize existing machines *at low cost and quickly!*

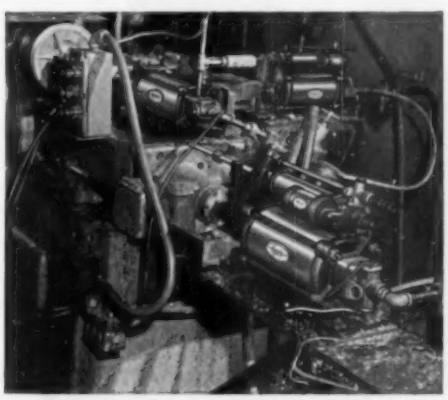
With parts normally available in every tool room, plus one or more Bellows Air Motors, and a little creative ingenuity, you can "spot modernize" scores of operations whose high cost whittles away at profits. The few illustrated here are typical of hundreds we can show you. The chances are good that no matter what you make, nor how you make it, this versatile air cylinder, with its *built-in* electrically controlled valve, can lend a mighty important helping hand to your cost reduction program.

Bellows Air Motors fill ice cream, add nuts and fudge, fold and seal the wrapper in this special machine.

THIS FREE "SPOT-A-MATION FILE" MAY SPARK AN IDEA IN YOUR MIND THAT CAN MEAN IMPORTANT COST SAVINGS

A note on your letterhead addressed to Dept. FA-1160, Bellows-Valvair, Akron 9, Ohio, will bring you basic data: wiring diagrams, installation details, equipment list, on a score of "everyday" operations almost every industry uses—and, if you wish, the services of a Bellows-Valvair Field Engineer, to help you adapt those ideas to your specific needs.

1313-B-3



Tail stock, tool bit, and cross-slide are moved by Bellows Air Motors in this lathe conversion.

Bellows-Valvair

AKRON 9, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

For more facts Circle 564 on Reader Service Card

Industry's most complete line of HEAVY DUTY FLOOR MACHINES

As America's most widely used machines for cleaning industrial floors, TENNANT Machines are standard equipment today —in 96 out of 100 major plants.

You will find them in a class by themselves for *removing hard grease-caked dirt from your floors in one operation*. Here are typical cost-saving models:

FOR CONGESTED AREAS—Rugged, versatile walk-behind Floor Machine (Model K). Instantly pulverizes and picks up soilage from 16" path. Powerful 1750 rpm wire brush shears off incrusted grime deposits and hurls it into the hopper. Leaves a clean, dry surface. Works close to machines, walls, etc. Gasoline or electric models; accessories for sanding, steel wool buffing, etc.

FOR AISLE CLEANING—Operator rides the TENNANT "L" as it cleans 21" path at speeds up to 3 mph. Cylindrical tool revolves at 1600 rpm. Shaves off heavy build-up of grease, dirt, wax, rubber deposits, metal chips and dried paint, at *a single pass*.

Cleans up to 4000 sq. ft. per hour . . . a rate 6 men couldn't equal by hand.

Picks up as it cleans. Powerful vacuum system controls dust. Leaves smooth, level surface for efficient trucking.

Has sensitive hydraulic controls; tool pressure is easily adjusted to obtain desired cleaning action. Has ample power to remove thick, heavy grime.

FOR HIGH SPEED CLEANING—Powerful 25 hp TENNANT "R" cleans and picks up grime from 36" path; moves with traffic at speeds up to 6½ mph. Shaves off grease and dirt to leave floor clean, dry, smooth, with excellent traction.

Cleans as fast as a 6 to 18 man scraping crew . . . and does a far better job. Vacuum system controls dust. Ten cubic foot hopper holds approximately 700 lbs. pulverized grime; lifts and dumps hydraulically in seconds.

WRITE TODAY *for illustrated bulletins . . . photos and data on how to reduce floor cleaning costs. G. H. Tennant Co., 705M N. Lilac Drive, Minneapolis 22, Minn.*

Industry's Most Widely Used
FLOOR MACHINES

OUR 90th YEAR
TENNANT

SPECIALIZED MAINTENANCE EQUIPMENT

POWER SWEEPERS • FLOOR MACHINES • SCARIFIERS • ROOF SCRAPERS • CONCRETE ROUTERS

For more facts Circle 565 on Reader Service Card

WANT TO SAVE 20-25% ON FUEL THIS SEASON?

You can by heating the Infra-Red PANELBLOC way

Savings of 20-25% on fuel costs for Panelbloc plants are not uncommon.

That's because Panelbloc "Heats Like the Sun." Panelbloc generates healthful infra-red waves that warm everything and everyone in their effective range. Panelbloc warms floors, machinery, furniture and people — NOT the surrounding air.

Overhead gas-fired Panelbloc has no moving parts — no fans, motors or blowers. No electrical connections needed, and that means big savings in maintenance.

Panelbloc can heat any part of a building, or the entire area. Different temperatures can be maintained in the same open area — WITHOUT PARTITIONS.

Low in first cost, Panelblocs are economical to install. AGA and UL approved.

Write for Bulletin 1-60-R

PANELBLOC DIVISION
THE BETTCHER MANUFACTURING CORP.
3106 West 61 St., Cleveland, Ohio

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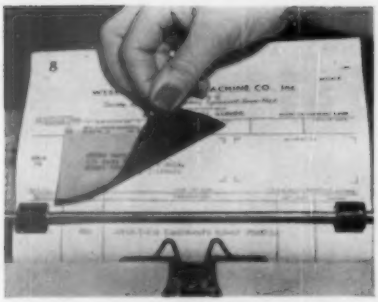


WEBER "TAB-ON" STENCILS can be integrated with any and every type of order processing system. Forms and stencils can be prepared with customer's address simultaneously on any typewriter or type of data processing equipment. After typing, stencil is taken from form: placed on a Weber handprinter for direct-to-carton addressing, or used with Weber label printing machines.

Write for "TAB-ON" Stencil Bulletin

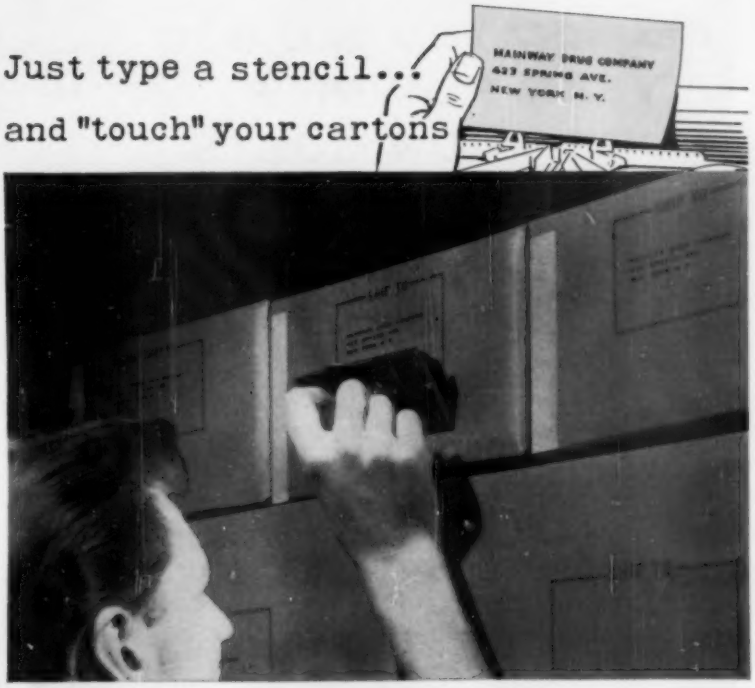
WEBER LABEL PRINTING MACHINE prints all kinds of labels—shipping, product identification, box end, etc. Printing head is interchangeable—reproduces from either stencil or rubber mat. Produces 105 labels per minute—printed, cut to size and stacked—all in one automatic operation. Ends label buying and inventory headaches.

Write for Model 80 Bulletin

"FACSIMILE LABEL" STENCILS can be die-cut in a facsimile of your present shipping label with all standard information pre-cut. Type or write the shipping address, place the stencil on a Weber handprinter, and with just a touch the complete label including address is printed directly on the carton. It's waterproof, fadeproof, and can't come off!

Write for Facsimile Label System Bulletin

Just type a stencil... and "touch" your cartons



Fastest, easiest way to address your multiple carton shipments

Weber "Touch-Stenciling" replaces labels and stencils boards. It's fast, neat and systematic

Want a quick, easy way to address shipping cartons? Then try this new Weber "Touch-Stenciling" system—means no more stencilboards, rubber stamps or label typing.

Shipping cartons, pre-printed with "Ship-To" label frames, are addressed by simply printing the customer's name and address within the frames with a Web-O-Print hand duplicator. It prints from a stencil that you can type or handwrite. Just a "touch" on the carton leaves a clear, sharp, permanent print.

With a smooth, one-hand motion 40 to 50 cartons can be addressed in a minute. After the shipment is addressed the stencil is thrown away, saving filing time and space.

Weber stencils can be prepared as part of your order-invoice writing procedure to save time and eliminate shipping errors. They can be cut as a by-product of forms typing on manual or electric typewriters, automatic accounting machines and other modern office equipment.

FREE BOOKLET TELLS SAVINGS STORY!
Write today for new booklet—How to Save Time and Money with "Assembly Line" Shipment Addressing.

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Sales and Service in all principal cities

WEBER MARKING SYSTEMS, INC.
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Send me your bulletin on "Assembly Line" Addressing Systems.

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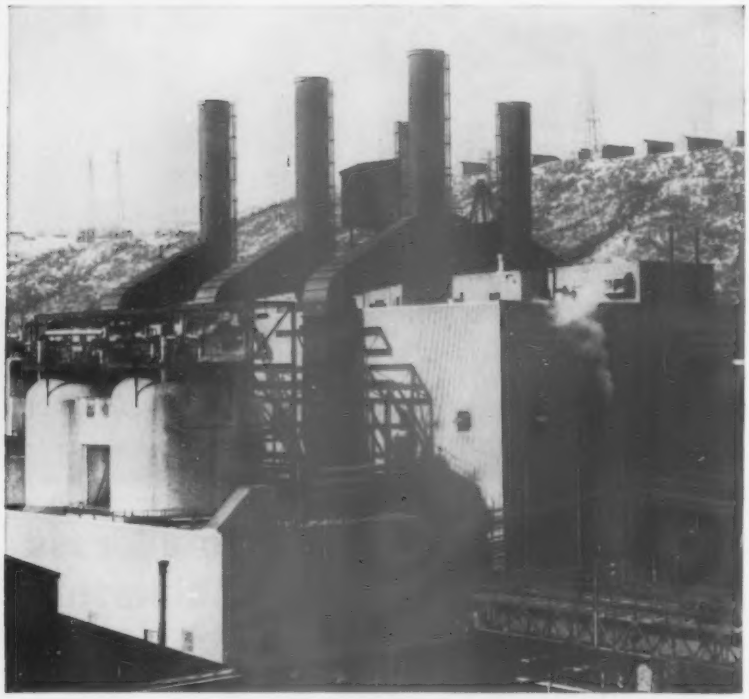
Position_____
Address_____
City_____ Zone_____ State_____

HOW HAGAFILM® ELIMINATED $10,000 A YEAR POWER PLANT CORROSION COSTS



Quick case history—reading time 52 seconds

THE PLANT: Large power station serves U.S. Steel's National Tube Division at McKeesport, Pa. Monongahela River water is used for boiler make up.

River water is clarified with Hagan Coagulant Aid and alum, softened with lime and soda ash and deaerated for use in boilers. Desuperheating condensate system was forecast as corrosion weak spot because of high CO_2 in steam. To evaluate cost of maintenance versus treatment, National Tube engineers adopted a "wait and see" policy.

THE PROBLEM: Magnitude of corrosion was almost unbelievable. Standard 1″ x 2″ x 20 gauge carbon steel test strips pitted through within 24 hours. Low pressure heater shells had to be continually patched. Spill-over lines and fittings failed almost weekly. Maintenance costs rocketed to a high of $10,000 a year.

THE SOLUTION: Treatment with Hagafilm reduced corrosion rate from a no treatment level of 1285 to less than 1 mg/dm²/day with a 4 ppm feed; and to a range of 5 to 10 mg/dm²/day with a 2 ppm feed. Present feeding is 3 ppm.

RESULTS: Since introduction of Hagafilm four years ago, no failures have occurred in spill-over system lines and fittings. Corrosion in entire system has been arrested.

National Tube engineers say that Hagafilm treatment has already paid for itself many times over in reduced labor and maintenance costs.

FOR FULL INFORMATION on Hagafilm, write for free Bulletin 410-12-7.

HAGAN
CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.

HAGAN DIVISIONS: CALGON CO.–HALL LABORATORIES–BRUNER CORP.

How To Get Things Done Better And Faster

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BETTER VISION PRODUCTS

The Modern Liquid Method that Cleans Glass or Plastic at Lower Cost per Cleaning.

The K-Lens-M Goggle Cleaning Station cuts down maintenance time for refilling; holds 1400 K-Lens-M lens tissues; dispensing one sheet at a time; holds full 16 oz. bottle of K-Lens-M lens cleaner.

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The **WILKINS Co.**, Inc.
Cortland 41, N. Y

Wise to Choose — Safe to Use

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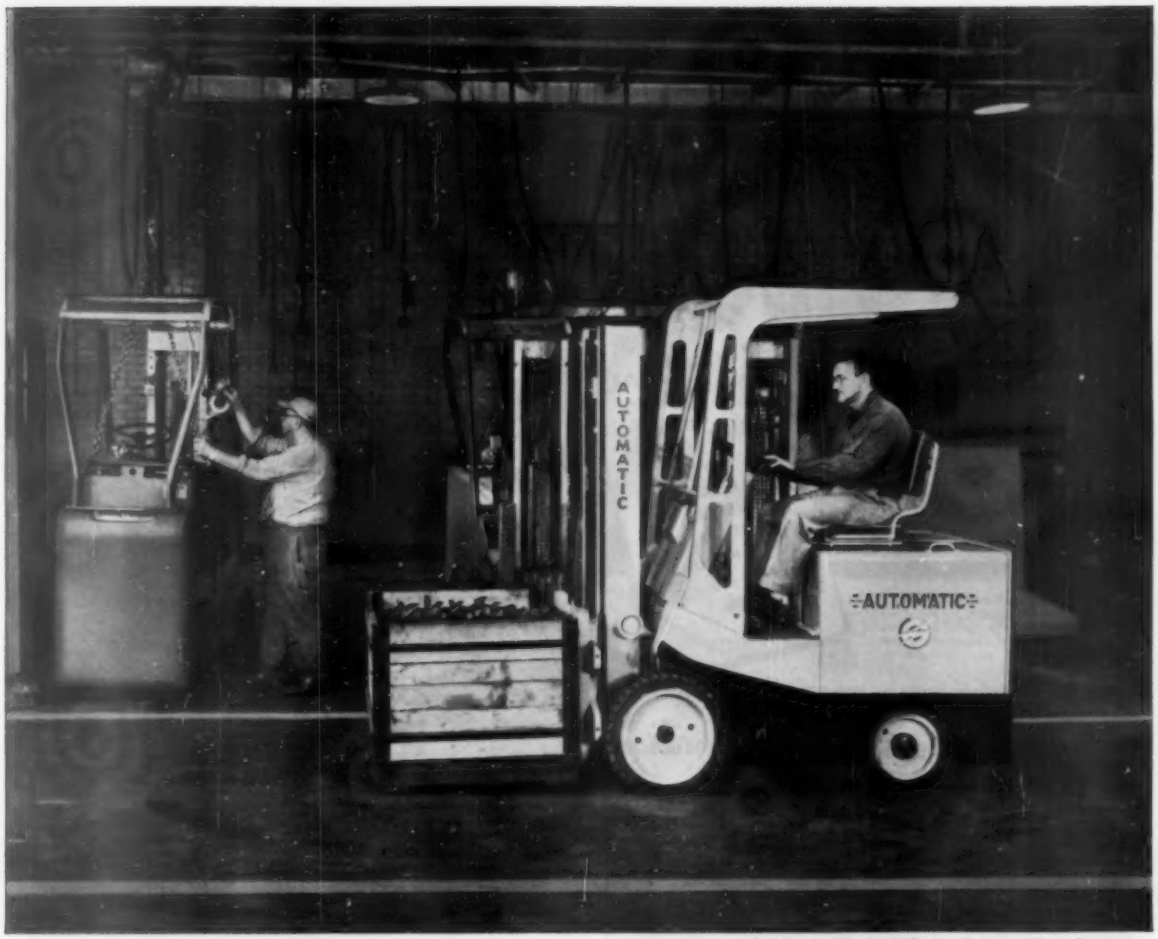

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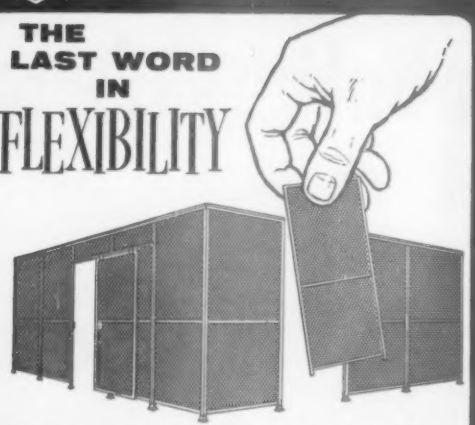
THE LAST WORD IN FLEXIBILITY



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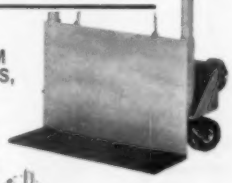

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Kidde

Kidde Ultrasonic & Detection Alarms Division, 1132 Brighton Road, Clifton, N. J.
Walter Kidde & Company, Inc.

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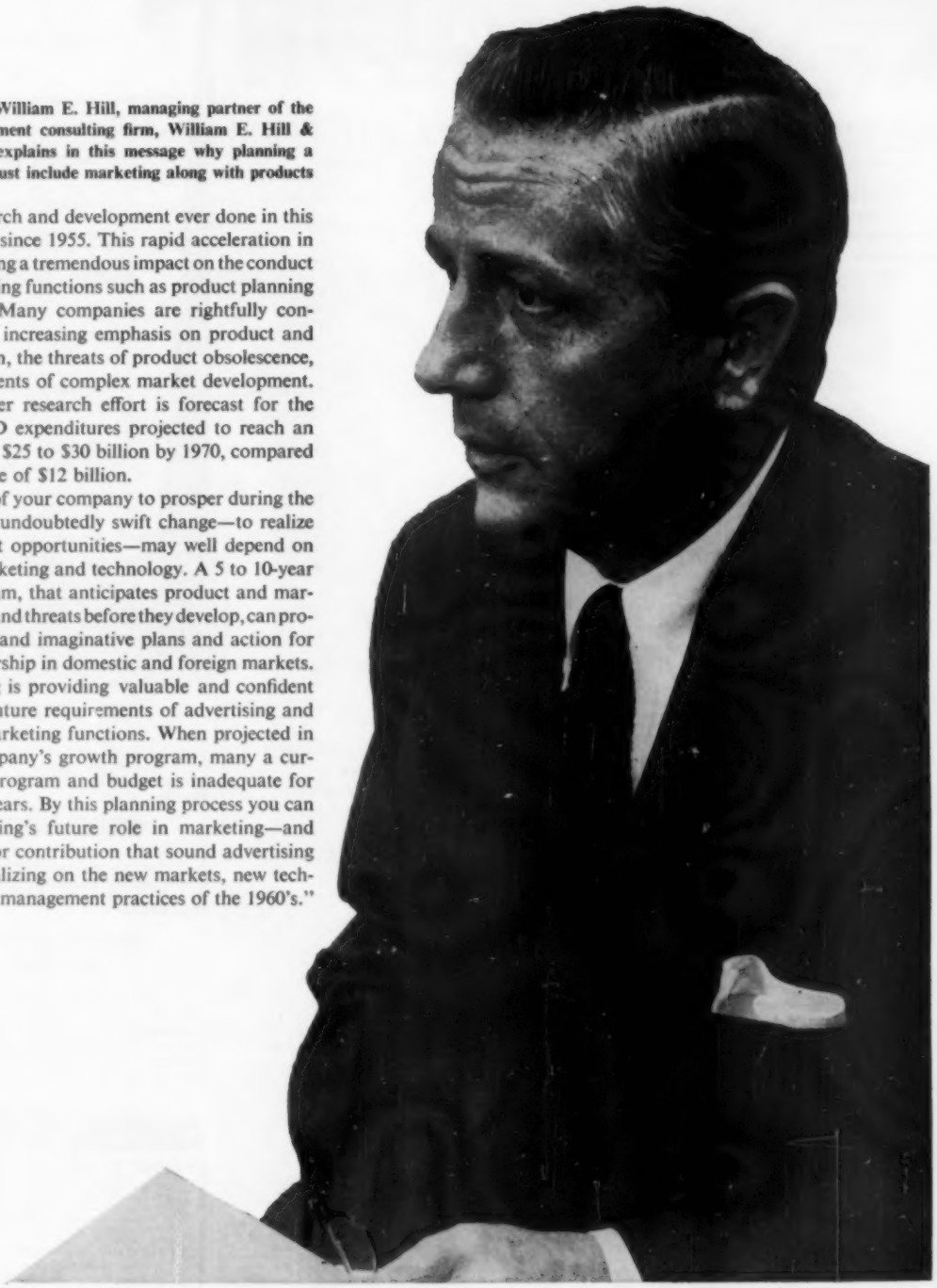

"Certainly," says William E. Hill, managing partner of the New York management consulting firm, William E. Hill & Company, and he explains in this message why planning a company's future must include marketing along with products and processes.

"Half the research and development ever done in this country has been since 1955. This rapid acceleration in technology is having a tremendous impact on the conduct of specific marketing functions such as product planning and advertising. Many companies are rightfully concerned about the increasing emphasis on product and process innovation, the threats of product obsolescence, and the requirements of complex market development. And still a greater research effort is forecast for the 1960's, with R&D expenditures projected to reach an estimated level of $25 to $30 billion by 1970, compared with a present rate of $12 billion.

"The capacity of your company to prosper during the next ten years of undoubtedly swift change—to realize the period's profit opportunities—may well depend on your creative marketing and technology. A 5 to 10-year long-range program, that anticipates product and market opportunities and threats before they develop, can provide the advance and imaginative plans and action for competitive leadership in domestic and foreign markets.

"Such planning is providing valuable and confident insight into the future requirements of advertising and its companion marketing functions. When projected in relation to a company's growth program, many a current advertising program and budget is inadequate for the next 5 to 10 years. By this planning process you can optimize advertising's future role in marketing—and establish the major contribution that sound advertising can play in capitalizing on the new markets, new technologies and new management practices of the 1960's."

AIA

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(Classified Advertising)

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Established mid-western manufacturing firm has opening for a mechanical designer to design and layout conveyor systems, foundry facilities, cleaning and painting systems and other miscellaneous special production equipment. Three to five years experience in these fields required. Furnish detailed resume of experience and education, salary requirements and availability.

P-5515 Factory
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TO EMPLOYEES

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We make this suggestion in a spirit of helpful cooperation between employers and employees.

This section will be the more useful to all as a result of this consideration.

Classified Advertising Division
McGRAW-HILL PUBLISHING CO., INC.
330 West 42nd St., New York 36, N. Y.

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Salaried Personnel—$6,000-$30,000. This nation-wide service successful since 1927 finds openings in your field. Sells your abilities; arranges contacts. Present position protected. Write for details. Address: Jira Thayer Jennings, Dept. F, P.O. Box 674, Manchester, Vermont.

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McGRAW-HILL PUBLISHING COMPANY, INC.
By JOHN J. COOKE, Secretary

Sworn to and subscribed before me this 15th day of September, 1960.

(SEAL) JANET A. HARTWICK
(My commission expires March 30, 1961)

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- ★ Available hand or power propelled
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Fenwal CONTROLS TEMPERATURE . . . PRECISELY

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